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Automated X-Ray Fluorescence Analysis Unit and Its Use In Space and Clinical Medicine

18400165a Moscow MEDITINSKAYA

RADIOLOGIYA in Russian Vol 33 No 10, Oct 88

(manuscript received 10 Jul 87) pp 64-69

[Article by Ye. G. Biryukov, G. I. Borisov, Yu. V. Fedorov, V. V. Zhidkov and V. I. Lobachik, Institute of Atomic Energy imeni I. V. Kurchatov; Institute of Medical-Biological Problems, USSR Health Ministry, Moscow]

[Abstract] Since the physiological changes induced by the combination of weightlessness and other factors of spaceflight could threaten the safety of space expeditions, systematic means of studying the functions of the body of cosmonauts and individuals in ground-based simulation experiments are needed. X-ray fluorescence analysis is a rapid, automated, highly productive nondestructive testing method which does not expose patients to dangerous radiation. This article describes the adaptation of x-ray fluorescence analysis to space-medicine for the purpose of rendering results reproducible and more precise, reducing the amount of blood needed for testing, and preserving biological blood specimens during space expeditions and in the clinic. X-ray fluorescence analysis is used to study changes in the volume of extracellular fluid, to examine plasma composition, and to determine the effectiveness of the use of medications in the treatment of certain pathological conditions accompanying changes in the hydration status of homeostasis and mineral metabolism. It measures levels of sulfur, chlorine, potassium, calcium and bromine in blood plasma. The method can not only diagnose changes in water-salt homeostasis, but also quantitatively evaluate small functional subpathologic changes in the body. The method was tested in a 120-day antiorthostatic hypokinesia experiment. The method is suitable for experiments involving small animals, since the required specimen size is quite small. Figures 2, references 10: 7 Russian, 3 Western.

UDC 612.858.06:612.766.1].086.2

Ultrastructural Changes In Vestibular Receptors of the Labyrinth of the Ear Following Acceleration

18400165B Moscow VESTNIK

OTORINOLARINGOLOGII in Russian

No 5, Sep-Oct 88 (manuscript received

03 Nov 87) pp 38-42

[Article by Professor V. F. Anichin and candidate of medical sciences A. T. Pakunov, Department of Otorhinolaryngology and Department of Morphology, Central Scientific Research Laboratory, Leningrad Sanitary-Hygienic Medical Institute]

[Abstract] A study was made of disorders in receptor ultrastructure in the vestibular apparatus in 16 guinea pigs and 15 chinchilla rabbits exposed to 10 g acceleration for 5 minutes in a centrifuge. The animals were

sacrificed after 5 minutes, after 1, 6 and 24 hours and after 2 weeks following acceleration. Ultrastructural changes were observed in receptor and supporter cells of the utricle and saccule, with leakage of the cytoplasm into the endolymphatic space and concentration of light mitochondria without matrices beneath the cuticle in the area of the basal body. Photomicrographs are presented to illustrate typical changes that were also observed in preganglionic nerve fibers, though not in nerve endings. The ultrastructural changes were present at 6 hours but generally disappeared by 24 hours. These changes are a probable cause of one component of motion sickness. Figures 4, references 17: 12 Russian, 5 Western.

UDC 613.165.6-07:616.5-008.97-078

Effect of Ultraviolet Radiation on the Microbial Dissemination in Human Skin

18400232a Moscow GIGIYENA I SANITARIYA in Russian No 9, Sep 88 pp 19-21

[Article by N. Ye. Panferova, V. I. Pervushin, G. O. Pozharskiy, and A. G. Prishchep]

[Abstract] One of the principal means of preventing a UV deficiency in humans confined to closed, pressurized spaces is to irradiate them with artificial sources, the most widely used therapeutic sources being medium-frequency sources. The relationship, however, between the accompanying bactericidal effect and source power and radiation dose is unclear. The researchers studied the effect of medium-frequency UV radiation on the microflora of the skin of the upper half of the human body in 28 men aged 28-50. The sources had various powers, and the sessions were of varying lengths. The tests were conducted in February and March. Five individuals made up the control group, which was not exposed to UV radiation. The remaining individuals were broken up into four groups, with each individual undergoing 20 sessions of irradiation of the back, the chest, and the stomach with a mercury-quartz or luminescent source. The irradiation dose was increased in one group to a value of 2 or 3 MED (minimum erythematous dose) from 0.5. The dose was 0.75 MED in the other groups. Sensitivity of the skin was found to vary widely from individual to individual. On average, however, the effects noted in groups 2, 3, and 4 (0.75 MED) were similar after 1, 10, and 20 sessions. All the sources had a marked bactericidal effect. The experiment results indicate that exposure of the skin to UV radiation is accompanied by a reduction of roughly 44 percent in overall microbial dissemination in the irradiated areas. The researchers assume that the changes in the automicroflora of human skin exposed to UV radiation are associated with enhanced function of the protective antibacterial mechanisms of the skin and with a direct bactericidal effect. Six references (Russian).

UDC 582.28

Rust Fungi of Grassy Plants in Ural Oblast

18400166 Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSSKOGO SSR: SERIYA BIOLOGICHESKAYA in Russian No 4, Jul-Aug 88 pp 27-31

[Article by S. A. Abiyev and B. Zh. Yesengulova, Institute of Botany, KazSSR Academy of Sciences]

[Abstract] The infection process and cross-infection with rust occur under conditions of condensing moisture. The development of this disease depends on the frequency of rainfall. The latter indicator changes dramatically from year to year in the Ural Oblast. During March-May 1986 the rainfall was 5-8 times below the average precipitation for this period. Thus, brown rust which wintered well in the winter grain was practically absent during the period of flowering and lactic ripening. Data from the 1986 year on the species composition and distribution of rust fungi on cereal and wild grasses in the Ural Oblast were reported: *Puccinia persistens* Plowr.; *P. recondita* Rob. ex Desm.; *P. graminis* Pers.; *P. hordei* Ottl.; *P. agropyri* Ell. et Ev.; *P. poarum* Niels.; *P. coronifera* Kleb.; *P. pygmaea* Eriks.; *P. bromina* Eriks.; *P. agrostidis* Plowr.; *P. elymi* West.; *P. festucae* Plowr. and *P. lasiagrostis* Tranz.

UDC 632.938.2

Race-Specific Immunosuppressors of Potato Phytophthora Infection Pathogen

18400245b Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 5, Sep-Oct 88 pp 727-732

[Article by N. I. Vasyukova, G. V. Leontyeva, G. I. Chalenko, T. Ye. Medvedeva, and O. L. Ozeretskovskaya, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] The researchers compared the nature of the action of *Phytophthora infestans* (Mont.) de Bary immunosuppressors— β -glucanes and glycoproteins. Cytoplasmic β -1, 3- β -1, and 6-D-glucanes, as well as cell wall glycoproteins of the pathogen, produced an identical effect on the interaction of potato tissue and both incompatible and compatible races of the pathogen, suppressing the resistance of the host-plant when the race from which they were taken was compatible with the potato, but having no effect on resistance—sometimes even stimulating it—when the race was not compatible. In another set of experiments, the β -glucanes taken from both compatible and incompatible races of fungus had no visually discernible effect on the parenchymal cells of potato tubers. The glycoproteins, however, were capable of demonstrating a phytotoxic effect that was especially distinctive when the glycoproteins were from a compatible race of fungus: 40 percent of all the surface layer cells were killed. Glycoproteins from an incompatible race resulted in necrosis in only 7 percent.

The necrosis, which appeared in the first few days after exposure, did not increase over a 10-day period. Both types of suppressors inhibited the formation of a wound periderm, but the specificity of the action of the glycoproteins was less pronounced. The nature of inhibition differed: the glucanes forced the periderm to form three times deeper than in the control, whereas the periderm formed on the surface when the glycoproteins served as the suppressor. Like the glucanes, however, the glycoproteins from a compatible race of fungus severely inhibited the restoration of the meristem activity in the parenchymal cells. The researchers suggest that the glycoproteins belong to a class of toxins (since they kill the cells of the host-plant), whereas the glucanes belong to "impedins" (because they merely impede protective response). References 14: 10 Russian, 4 Western.

UDC 633.1:581.2

Inhibitory Effects of Triticale on Appresoria Formation by Rust Fungus

18400250a Moscow DOKLADY VSESOFUZNOY ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII NAUK SELSKOKHOZYAYSTVENNYKH NAUK IMENI V.I. LENINA in Russian No 10, Oct 88 (manuscript received 17 May 88) pp 2-3

[Article by V. P. Lanetskiy, V. B. Timofeyev and L. I. Shurovchenko, Kuban Agricultural Institute; Krasnodar Scientific Research Institute of Agriculture]

[Abstract] In order to provide more definitive information on the resistance of triticale to rust fungi, an analysis was conducted on fungal death rate before and after appresoria formation on the surface of leaves and stems of various strains of triticale. The results were compared with those secured for the susceptible strain Michigan Amber. The resultant findings demonstrated that on the strains tested, appresoria formation was reduced 4- to 21-fold in comparison with the susceptible strain. The strains with the highest resistance included 844T-28, 257T 1-188-29, 257T 1-109, 257T 1-167, and AD-green. Thus, the phenomenon of fungal death before and after appresoria formation that had been observed on resistant varieties of wheat appears to be applicable to triticale. References 10 (Russian).

UDC 631.52:632.9:633.12

Pathogenicity of Viral Earburn in Buckwheat and Buckwheat Breeding for Resistance

18400250b Moscow DOKLADY VSESOFUZNOY ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SELSKOKHOZYAYSTVENNYKH NAUK IMENI V.I. LENINA in Russian No 10, Oct 88 (manuscript received 7 Apr 88) pp 4-6

[Article by Ye. S. Alekseyeva, V. K. Shevchuk, T. Ye. Shevchuk and Yu. A. Kalashyan, Kamenets-Podolskiy Agricultural Institute]

[Abstract] Cultivated and wild varieties of buckwheat were tested for their susceptibility to viral earburn and

the nature of pathogenicity under various conditions in order to determine conditions favorable for the breeding of resistant varieties. Viral earburn of buckwheat was first noted in Western Ukraine, in the early fifties, and has since been reported in other regions of the USSR and in Canada. Present research has shown that the pathogen is not transmitted by dried plant residues and that the infection does not persist under the conditions of a herbarium. In addition, 17 species of insects have been implicated in the transmission of the virus under natural conditions, including *Aphis evonymi*, *Psamotettix striatus*, *Aphalara exilis*, and *Cymnoderata*. Electron micrographs have led to the identification of the virus as a bacillary-shaped entity, with further analysis of its characteristics under way. Afflicted plants are shorter by some 36-52 percent than healthy plants, with a corresponding reduction in productivity of 75-85 percent. Plants planted early (April-May) are less susceptible to infection by viral earburn than plants planted later in the season (June-July). Among the buckwheat varieties tested for resistance, *Fagopyrum cymosum* and *F. tataricum* were found to be most resistant, as were the phylogenetically close genera *Polygonaceae*, *Polygonum bistorta*, and *P. sachalinense*. In addition, chemically-induced mutations have also yielded promising varieties, as did gamma-irradiation of the seeds in combination with selected chemical mutagens or with irradiation by red or UV lasers. Figures 2; references 7: 6 Russian, 1 Western.

UDC 576:578.8

Lack of Complementation of TMV Transport Function in Mixed Infections With Viroid

18400250c Moscow DOKLADY VSESOFIYUZNOY ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENTA AKADEMII SELSKOKHOZYAZSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 10, Oct 88 (manuscript received 16 May 88) pp 10-12

[Article by O. A. Kondakova, S. I. Malyshenko, K. A. Mozhayeva, T. Ya. Vasilyeva, M. E. Talyanskiy and I. G. Atabekov, academician, VASKONIL, Moscow State University imeni M. V. Lomonosov All-Union Scientific Research Institute of Phytopathology]

[Abstract] Studies were conducted on the virus transport function of TMV Ls-1 in tomatoes in conjunction with infection by the potato tuber spindle viroid. Since Ls-1 is temperature dependent in terms of transport function, the studies were conducted at 24 and 33°C under conditions of low TMV concentrations in the inoculum. The potato tuber spindle viroid appears to stimulate selection and accumulation of revertants and/or tr-contaminants of TMV Ls-1 in tomato plants under nonselective temperature conditions. References 10: 3 Russian, 7 Western.

Diagnosis With a New Enzyme

18400194 Moscow ADVANCES OF SCIENCE AND TECHNOLOGY in English No 126, 15 Sep 88 pp 1-3

[Article by Alexander Kogalov]

[Text] Moscow State University has developed a new variant of enzyme immunoassay based on pyrophosphatase. The enzyme is sensitive, stable at high temperatures and inexpensive to produce.

The method includes the technology of enzyme production, the manufacture of diagnostic kits and techniques of using them.

How can we find out if a human body contains a virus? Often it is a life-or-death matter for a patient. Enzyme immunoassay is one such method of early diagnosis. This analysis is used throughout the world in detecting over 50 diseases, including AIDS, hepatitis, tumors, myocardial infarction, rubella, diphtheria, whooping cough, respiratory viral diseases, and others.

One of the vital problems in the context of the current health service reform is to screen the population annually for preventive purposes and for early diagnosis of diseases. The method of enzyme immunoassay may be very effective here. Experts have estimated that such screening requires no less than a billion tests a year, and it is very important that the method developed at Moscow University, apart from other advantages, is also very cheap.

What is it all about?

"The new method is based on the main property of our immune system—its ability to detect and eliminate foreign agents getting into our bodies—antigens," said Doctor of Chemistry Svetlana Avanova. She is head of the protein chemistry sector of the Belozersky Inter-faculty Problems Laboratory of Molecular Biology and Bioorganic Chemistry. "The immune system produces a special class of proteins—specific antibodies, each tailored against its own antigen. Enzymatic analysis is based precisely on antibody-antigen interaction. These two substances interact to form a very stable complex. It is this complex that needs to be sought. But how? An enzyme—a biological catalyst that makes the complex enter into a chemical reaction—is indispensable here. The reaction proceeds very fast—with 1,000 substrate molecules transforming themselves within one second. A minute produces 60,000 of them. And since the reaction may last up to twenty-four hours, it is possible to spot a virus in the body when it is present in very minute amounts, that is, at the start of a disease. The method can be compared to lens action: the longer the reaction, the more powerful the lens. Ideally, every family should have a simple and inexpensive indicator of health, giving a Yes or No answer. Some people want to know if they

have flu, while others are concerned whether their children abuse drugs, or if there is a pregnancy. In the US, this task has already been set.

"Inorganic pyrophosphatase is very suitable for such tests. The enzyme is cheap to produce, stable to high temperatures and light and safe to handle. We have proposed an original method of its industrial manufacture. A quantity of 150 mg is enough for almost a million tests. The enzyme can be stored under normal conditions. Moreover, pyrophosphatase does not lose stability up to plus 72°C. Tests carried out with it are 5 to 10 times more sensitive than say with peroxidase. Unlike it, our enzyme is absolutely safe. Analysis requires one drop of human or animal blood. Besides, the pyrophosphatase substrate is by far less expensive than other enzyme substrates used in enzyme immunoassay."

The new variant proposed by Moscow University scientists can also be used in livestock farming. It can determine the hormonal activity of animals, which is essential for cattle productivity. It is also indispensable when purchasing elite material. Another sphere of application is in seed growing. A simple visual inspection of the color assumed by a solution—from light-yellow to blue-green—will tell you whether the seeds are sound, slightly infected or not fit for planting at all.

All these advantages show that the new variant of testing based on pyrophosphatase holds promise in many areas. (APN)

UDC 616-0.73.916

Radioimmunoassay (RISA). A New One-Step, Nonseparating Method for Radioimmunologically Determining Biologically Active Compounds

18400160b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 302 No 6, Oct 88 pp 1504-1506

[Article by A. P. Osipov, A. M. Yegorov, V. A. Lebedev, M. A. Orlova, I. V. Golubitskaya, O. S. Chechik, A. M. Blinkovskiy, N. V. Lyudvig, USSR Academy of Medical Sciences Member V. I. Pokrovskiy, Moscow State University imeni M. V. Lomonosov; All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev, Leningrad; Central Scientific Research Institute of Epidemiology, Moscow]

[Abstract] A fundamentally new one-step method for determining biologically active compounds—which the researchers call radioimmunoassay assay (RISA)—is proposed. The method requires no physical separation of solid and liquid phases and is based on the use of a solid immunoscintillator that measures the intensity of light emissions produced in the interaction of the short-range corpuscular radiation of tritium or ^{133}I and a polystyrene matrix that contains the scintillator and specific antibodies adsorbed to the surface of the matrix to directly record a radioactive label (3H or ^{133}I)

in the immune complex. Since the range of tritium B-particles, conversion electrons, and Auger electrons formed in the decay of 125 I does not exceed 25 μm , virtually none of the molecules that contain the radioactive label and that are present in the water volume of the system are recorded; whereas some of the labelled ^3H or the ^{125}I molecules of the ligand that are located very near the surface of the carrier—primarily in the form of specific antibody-antigen complexes adsorbed on the carrier—are capable of inducing light emissions of the scintillator linked to the polystyrene matrix. The researchers examine two variations of the radioimmuno-scintillation assay of estradiol in aqueous solution that use either labelled tritium or components of a standard commercial set of reagents. The method—which requires no use of scintillation cocktails and may be employed in immunoassay in other methods, such as the sandwich method—may be used for direct tracking of the binding and desorption of labelled compounds and ligands immobilized on the surface of the solid scintillator. Two figures. 5 references: 3 Russian, 2 Western.

UDC 547.955'639+577.115.4

Studies in the Area of Complex Lipids. Synthesis of Ionophore Derivatives of Diphosphatidylglycerin (Cardiolipin)
18400167a Moscow BIOORGANICHESKAYA KHIMIYA in Russian
Vol 14 No 8, Aug 88 pp 1068-1074

[Article by Yu. V. Kuzmina, A. P. Kaplin, V. I. Shvets, V. A. Sayenko, and Ye. M. Yegorova, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk, Institute of Electrochemistry imeni A. N. Frumkin, USSR Academy of Sciences, Moscow]

[Abstract] Modified phospholipids are widely used in the study of biological membranes and membrane models. With an eye to expanding the means and methods available for studying the functioning of phospholipid membranes, the researchers synthesized cardiolipin analogs that contained an ionophore fragment in the hydrophobic moiety of the molecule, at the end of one of the fatty acid chains. A representative of the benzo-crown esters, dibenzo-18-crown-6, which demonstrates ionophore activity with respect to model and cellular membranes, was used as the ionophore. So that the length of the fatty acid residue modified by the ionophore would be close to that of the natural fatty acids that make up lipids, the dibenzo-18-crown-6 was combined with 1,10-decanedicarboxylic acid. Disubstituted crown-ester derivatives with 60-70 percent yield were produced via acylation by dicarboxylic and monocarboxylic acids, with polyphosphoric acid and a saturated solution of phosphorus pentoxide in methanesulfonic acid as catalysts and the reaction medium. Lysocardiolipins were produced via enzyme hydrolysis of cardiolipin from a beef heart with phospholipase A₂ from the venom of the

Naja nana oxiana cobra. They were acylated with the fatty acid ionophore, the monolysocardiolipin forming a product containing a lipid phosphorus and a crown ester, and the dilysocardiolipin forming two lipid-like products containing the ionophore group. Acylation was shown to proceed through the second position of the glycerin skeleton of the phosphatidyl residues. The modified cardiolipin that was produced demonstrated immunological activity identical to the activity of natural beef heart cardiolipin. Three figures. 17 references: 9 Russian, 8 Western.

UDC 577.352.465

Effect of Metridiolysin From the Sea Anemone *Metridium senile* on Biological Membranes and Membrane Models

18400167b Moscow BIOLOGICHESKIYE MEMBRANY in Russian
Vol 5 No 8, Aug 88 pp 830-835

[Article by M. M. Monastyrnaya, E. P. Kozlovskaya, A. S. Ivanov, A. A. Molnar, E. M. Khalilov, and G. B. Yelyakov, Pacific Institute of Bioorganic Chemistry, Far East Science Center, Academy of Sciences of the USSR, Vladivostok; Institute of Physico-Chemical Medicine, Ministry of Public Health of the RSFSR, Moscow]

[Abstract] Sea anemones are known to produce two groups of lipid-dependent cytolytic protein toxins: sphingomyelin-inhibited and cholesterol-inhibited hemolysins. The only known representative of the second group is metridiolysin from the anemone *Metridium senile*. Electron microscopy has shown the formation of ring-like structures 300 angstroms in diameter in membranes exposed to metridiolysin, but, until now, no ion channels have been found in biological membranes or membrane models. In order to clarify the mechanism associated with the increase in the ion permeability of membranes, the researchers studied the effect of metridiolysin on erythrocyte membranes and membrane models. The hemolytic activity of the metridiolysin was two orders lower than that of the sphingomyelin-specific toxin RTX from *Radianthus macrorhynchus*. Studies of lipid specificity on liposomes indicated that metridiolysin does not require the presence of cholesterol in the membrane to produce ion permeability. The researchers found that the electrical conductivity of flat bilayer lipid membranes (BLMs) washed with an aqueous solution that contained metridiolysin was 3-4 orders higher. They managed to predict the threshold concentration of the toxin, which depends on the ionic strength of the medium and fluctuates between 1 $\mu\text{g}/\text{ml}$ and 100 $\mu\text{g}/\text{ml}$. At a high ionic strength (1 M KCl), metridiolysin had no effect, even at a concentration of 120 $\mu\text{g}/\text{ml}$. When ionic strength was reduced, BLM conductivity began to grow, indicating that electrostatic interaction plays a considerable role in the mechanism of action of the toxin. The

ion channels that formed in the BLMs were potential-dependent. Five figures, 15 references: 4 Russian, 11 Western.

UDC 577.352.4

Photoactivated Radioactive Analogs of Calcium Antagonists of the 1,4-Dihydropyridine: Synthesis and Covalent Labelling of the Receptor in the Skeletal Muscle of the Rabbit

18400167c Moscow BIOKHIMIYA in Russian
Vol 53 No 8, Aug 88 pp 1247-1255

[Article by N. M. Soldatov, Scientific Research Institute of Biomedical Technology, USSR Ministry of Health, Moscow]

[Abstract] Dihydropyridine calcium antagonist receptors, which presumably are strictly potential-sensitive calcium channels, take part in the most universal of mechanisms of functioning of cell membranes. The dihydropyridine receptor has been found to be sensitive to phospholipases and proteases and, when membrane-bound, to have an oligomer structure with a total molecular weight of 100-200 kilodaltons. The researchers undertook a study of the potential-sensitive calcium channels of biological membranes, with a starting point of the direct chemical identification of the dihydropyridine receptor via covalent incorporation in its molecule of a radioactively labelled dihydropyridine derivative that would contain a photosensitive group in its functionally important site. The researchers performed direct chemical synthesis of two biologically active, photosensitive, radioactively labelled dihydropyridine derivatives and their use for covalent labelling and identification of the dihydropyridine receptor in membranes of the skeletal muscle of a rabbit. The dihydropyridine receptor was found to form with the participation of a polypeptide that has a molecular weight of 136 kilodaltons and whose dihydropyridine-binding site is probably located in contact with proteins with M_r of 60 and 38 kilodaltons. Five figures, 33 references: 2 Russian, 31 Western.

UDC 577.352.3:577.344:579.841.51

The Formation of An M-Type Intermediate in the Photocycle of 13-cis-Bacteriorhodopsin Adapted to Darkness. I. Solubilized Bacteriorhodopsin

18400235a Moscow BIOLOGICHESKIYE
MEMBRANY in Russian
Vol 5 No 9, Sep 88 pp 910-919

[Article by V. V. Zorina and A. D. Kaulen, Moscow State University imeni M. V. Lomonosova, Interfaculty Problem Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy]

[Abstract] Contrary to the popular belief that the formation of an M intermediate in the photocycle of 13-cis-bacteriorhodopsin is impossible, the researchers

found that 13-cis-bacteriorhodopsin can yield a short-wave M-type intermediate in a preparation solubilized to the monomer state. The formation cannot be linked to processes involving two quanta or more. Such a photocycle is accompanied by a proton in the incubation medium. Purple membranes isolated from *Halobacterium halobium* P353 were adapted to darkness. Solubilized bacteriorhodopsin adapted to darkness was also obtained. Both were then completely adapted to light—by illuminating the purple membranes in steady light for five minutes and exposing the solubilized bacteriorhodopsin to four "white" photoflashes. Based on the results, the researchers constructed a diagram of the photocycle of the solubilized bacteriorhodopsin whose distinguishing feature is that, at neutral and alkaline pH values, not only molecules of *trans*-bacteriorhodopsin, but also molecules of 13-cis-bacteriorhodopsin are capable, with the absorption of a light quantum, of undergoing a cycle of photochemical conversions, including the stage of formation of the deprotonated M410 intermediate. The nature of the change in the amplitudes of slow and fast phases in the adaptation to light and of the difference in the position of the longwave minima of the differential spectra of these phases indicate that at least some of the shortlived form of M410 is linked to the photocycle of 13-cis-bacteriorhodopsin, and the longer form of M410, to that of *trans*-bacteriorhodopsin. 13-cis-Bacteriorhodopsin loses its capability of forming M410 at pH < 7. The light-adaptation features of the Triton X-100 used in the experiment indicate that, with the absorption of a quantum of blue light, the M form of the photocycle of 13-cis-bacteriorhodopsin is converted to *trans*-bacteriorhodopsin with high efficiency. Six figures, 31 references: 8 Russian, 23 Western.

UDC 579.256.08

Transbarrier Transport of Artificially Hydrophobized Antibody Fragments

18400252c Moscow BIOTEKHNOLOGIA in Russian
Vol 4 No 5, Sep-Oct 88 (manuscript received
18 May 88) pp 648-651

[Article by V. P. Chekhonin, G. V. Morozov, I. A. Kashparov and I. A. Ryabukhin, All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskii, Moscow]

[Abstract] The use of radionuclide-labeled antibodies offers great promise in molecular diagnosis, but the technique may be compromised when the antibodies or their active fragments lack access to the site of the lesion. This may be the case in early stages of pathology when various histologic barriers and cell walls remain intact. Consequently, a study was undertaken to determine whether modification of antibody fragments by artificial hydrophobization could be used to render the system more specific and definitive. F(ab)₂ and F(ab) fragments were derived from immunoglobulins isolated from patients suffering from severe neurolepsy, with the antibodies exhibiting specificity against the glial acid antigen

(GFAP) and the α -2-glycoprotein (GP). The $F(ab)_2$ and $F(ab)$ fragments with anti-GFAP and anti-GP activities were hydrophobized by reaction with stearoyl chloride [Kabanov, et al., BIOL. MEMBRANY, 2: 985, 1985], radiolabeled with I-125, and tested for specificity of localization in outbred rats. Resultant monitoring for gamma-emission of the hydrophobized and unmodified radiolabeled antibody fragments over a period of several days demonstrated that peak brain activities were noted on the 3rd post-intracardiac injection day. Whereas the unhydrophobized fragments failed to penetrate the blood-brain barrier, the accumulation in the brain of the hydrophobized fragments represented more than 55 percent of the label found in all of the organs (heart, lungs, liver, kidneys, spleen, blood). The highest index of localization for both fragments was in the brain, exceeding by better than threefold the runner-up organs (liver, kidneys). In addition, the brain localization of the $F(ab)$ fragment was almost 1.7-fold better than that for the $F(ab)_2$ fragment. These observations demonstrated that appropriate modification of antibody fragments may enhance their access to desired target sites, in this case, transport across the blood-brain barrier. Figures 1; references 14: 4 Russian, 10 Western.

UDC 663.15

Bioluminescent Enzyme Immunoassay With Adenylate Kinase Market

*18400252d Moscow BIOTEKHNOLOGIYA in Russian
Vol 4 No 5, Sep-Oct 88 (manuscript received
26 May 87) pp 659-664*

[Article by T. V. Shutenko, Ye. M. Gavrilova and A. M. Yegorov, Moscow State University]

[Abstract] A solid-phase bioluminescent enzyme immunoassay was devised, the sensitivity of which was considerably improved by the use of adenylate kinase as the marker. The method was based on the preparation of an adenylate kinase-horseradish peroxidase (antigen) conjugate, with the conjugate retaining, respectively, 1.3 and 60 percent of the enzymatic activities of the two enzymes and their antigenic specificities. As employed here, the system was capable of measuring antigen concentrations as low as 10^{-12} M with 2 h incubation times by measuring market activity in the supernatant. Figures 4; references 8: 4 Russian, 4 Western.

UDC 577.3

Substances That Amplify Endocytosis and Sharply Accelerate the Fusion of Myoblasts

18400161c Moscow DOKLADY AKADEMII NAUK
SSSR in Russian Vol 303 No 1, Nov 88 pp 239-240

[Article by V. G. Ritter, V. Ye. Shungskaya, N. V. Samosudova, Yu. S. Larin, and USSR Academy of Sciences Corresponding Member L. M. Chaylakhyan, Institute of Problems of Information Transfer, USSR Academy of Sciences, Moscow]

[Abstract] Clarification of the mechanisms of eukaryotic cell membrane fusion enables researchers to produce specific effects on the course of the fusion, which is especially important for developing methods for, among other things, the production of monoclonal antibodies and cell reconstruction. Since poly-N-ethyl-4-vinylpyridinium bromide has been found to produce an immune-stimulating effect and to effectively accelerate fusion of synthetic membranes, and a similar effect is said to have been shown with latex particles, the authors used a culture of chick embryo muscle cells to study the effects of those substances on cells, comparing natural fusion and induced fusion. The latex particles and the bromide compound affected the myoblasts in two apparently interrelated ways: they stimulated intense absorption of extracellular material via endocytosis, and they accelerated the proliferation and fusion of the cells considerably. In fact, the endocytosis is accompanied by cell surface changes that are known to facilitate cell fusion. The assumption that endocytosis activates the fusion agrees with data that indicates that the fusion of alveolar macrophages in the formation of gigantic Langerhans cells is substantially accelerated when their phagocytic activity is artificially induced. Two figures, 14 references: 7 Russian, 7 Western.

UDC 573.3

Pseudoencapsulated Liquid Crystals of Nucleic Acids

18400161b Moscow DOKLADY AKADEMII NAUK
SSSR in Russian Vol 303 No 1, Nov 88 pp 232-235

[Article by Yu. M. Yevdokimov and S. G. Skuridin, Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences, Moscow]

[Abstract] The particles of disperse single-crystal phases formed by nucleic acids in aqueous polymer solutions constitute a model of the features of the organization of the double-stranded nucleic acids that are in viruses and chromosomes. The high concentrations of nucleic acids that are needed to form single-crystal phases present a problem for researchers, as does the anomalous optical activity of thin layers of cholesteric single-crystal phases. Disperse single-crystal phases themselves are relatively unstable. The researchers developed a method for creating pseudoencapsulated liquid crystals of nucleic acids—

i.e., for forming synthetic polymer matrices that contain microscopic liquid crystals—and illustrated some of the properties of such crystals with the example of single crystals formed from double-stranded DNA molecules and poly(I)-poly(C). Their results indicated that placing nucleic acid molecules into pseudoencapsulated liquid crystals is similar to placing them in single-crystal phases, which means that the properties of the pseudoencapsulated liquid crystals may be controlled by the same factors that were established in an earlier analysis of the properties of single-crystal phases of nucleic acids and synthetic polynucleotides. The pseudoencapsulation opens the way to studies of the properties of liquid crystals of biopolymers in controllable, easily reproducible conditions. The simplicity of the process and the delicate sensitivity to environmental changes and changes in the secondary structure of the nucleic acid molecules themselves may make practical use of the pseudoencapsulated crystals feasible. Two figures, 9 references: 4 Russian, 5 Western.

UDC 577.352.465

Cation Selectivity of Nonelectrogenic Ionophores Measured on a Bilayer Lipid Membrane: Nigericin, Monensin, A23187, and Lasalocid A

18400235b Moscow BIOLOGICHESKIYE
MEMBRANY in Russian
Vol 5 No 9, Sep 88 pp 992-998

[Article by Yu. N. Antonenko, Moscow State University imeni M. V. Lomonosova, Interfaculty Problem Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy]

[Abstract] Using a method they developed earlier for measuring nonelectrogenic flows through bilayer lipid membranes, the researchers study cation selectivity for nigericin, monensin, A23187, and lasalocid A—nonelectrogenic ionophores that do not carry their charge in the transfer of cations through membranes, effecting electrically neutral exchange for other cations. The method is similar to the bi-ionic potentials method and is based on the principle that, in transmembrane ion flows, local gradients of ion concentration occur in the layers near the membrane. After establishing a stationary potential on the bilayer lipid membrane in the presence of a nonelectrogenic ionophore and a protonophore, a gradient for another cation is created in the opposite direction. The gradient is increased until the potential on the membrane is equal to zero. At that point, the ratio of the transmembrane gradients of the concentrations of the corresponding cations is a measure of the cation selectivity of the ionophore. Selectivity is studied for equal-charged cation pairs: potassium and sodium ions and calcium and magnesium ions. Nigericin produced relative selectivity values for monovalent K⁺/Na⁺ cations of 25 plus or minus 4; monensin, Na⁺/K⁺, 16 plus or minus 4; and lasalocid A, K⁺/Na⁺, 12 plus or minus 1. The ionophore A23187, however, produced a value of 14 plus or minus 2 for Ca²⁺/Mg²⁺; lasalocid A, for the same cations, yielded 17 plus or minus 2. Three figures, 31 references: 5 Russian, 25 Western.

Photobiotechnology: New Potential of Microbiological Industry

18400272 Moscow ADVANCES OF SCIENCE AND TECHNOLOGY in English No 34, 10 Dec 88 pp 1-4

[Article by Svetlana Vinokurova, APN, science observer]

[Text] Photobiotechnology, a new term in world scientific literature, owes its origin to studies carried out by members of laboratories of the Moscow and Leningrad Universities, of the USSR Academy of Sciences' Institutes of Soil Science and Photo Synthesis and of Physiology of Plants Microbiology. For their pioneer work on fundamental principles of photobiotechnology a group of Soviet scientists have been awarded the USSR State Prize for 1988.

"It is a question of making use in biotechnology of photosynthesizing microorganisms whose vitality is accounted for by the Sun's energy," says Sergei Shestakov, corresponding member of the USSR Academy of Sciences, Professor at the Moscow University and now Director of the Institute of General Genetics USSR Academy of Sciences who is among the authors of a series of works. "The results of twenty years' work by a number of research groups have been published in more than 700 articles and 9 monographs both in the USSR and in other countries. New trends have emerged in the biology of photosynthesizing microorganisms, the practical importance of which for agriculture and microbiological industry is by no means insignificant. In particular, an important contribution has been made to the progress of genetics and genetic engineering of the organisms concerned."

In a brief commentary it is hardly possible to dwell on all the aspects of genetic research that have taken place. Methods of mutagenesis (change in heredity) have been developed for the first time and systems of gene transfer have been discovered, which have been instrumental in obtaining genetically altered forms (strains) of photosynthesizing microorganisms with biologically valuable properties. These are the producers of various biologically active compounds (enzymes, vitamins, etc.), hydrogen and ammonium.

A major task of photobiotechnology is associated with the production of nitrogenous fertilizers by utilizing biological nitrification. The production of mineral nitrogenous fertilizers involves today the consumption of great quantities of oil and gas, whereas the cells of certain photosynthesizing bacteria generate ammonium (which is easily assimilated by plants) due to the bioconversion of solar energy. At the Moscow University mutant strains have been obtained whose cells are capable of liberating ammonium formed in nitrification.

The cells are working as minifactories for the production of nitrogenous fertilizers directly from air. In a glass tube illuminated by light (this is how the simplest photobioreactor looks like), we may settle photosynthesizing

microbes on a sorbent and in such an immobilized state they will produce ammonium for many days. The ammonium goes from the tube into a receiver. If the cells are to be assembled on polyurethane films and applied, for instance, to rice fields, they will be functioning like biological nitrogenous fertilizers. This, in fact, the future's biotechnology.

"Another agriculturally important problem is associated with the study of photosynthesis genetics," notes professor Shestakov. "The point is that numerous herbicides, which are employed to suppress weeds, are blocking the process of photosynthesis. To be able to use these toxic chemicals without inflicting much ecological damage, we must grow cultivated plants resistant to herbicides. How can such plants be obtained? One of the methods boils down to using mutant cells of photosynthesizing microorganisms to isolate from them the photosynthesis genes responsible for resistance to herbicides, which are then to be transplanted to farm crops by employing the methods of genetic engineering. This is a complex but realistic task which is now being dealt with in different countries (USA, France, etc.) by taking advantage of the gene-engineering systems and cyanobacteria strains discovered by the Moscow University's researchers. These strains have been deposited in the International collection of microorganisms at the Louis Pasteur Institute in France and have become favorite model objects for research in numerous laboratories all over the world."

Research by the State Prize winning scientists has provided solutions for numerous urgent problems in physiology, biochemistry, ecology and systematics of photosynthesizing microorganisms. New species, genera and strains of microbes have been discovered, and complex biological phenomena associated with a unique way of life of these organisms have been deciphered. Unless we learn the biological laws common to photosynthesizing microorganisms, we shall be unable to work out methods of photobiotechnology.

Professor Ivan Gogotov and Professor Viktor Semenchenko with collaborators have developed automated complexes of setups for controlled growth of these microorganisms and have worked out optimized rules for the syntheses of valuable biopreparations under experimental conditions. Today we are facing the task of starting the photobiotechnological production of numerous valuable substances. For instance, a change-over to commercial production of ubiquinone (used in the treatment of various diseases) on the basis of mutant forms of photosynthesizing bacteria, which have been obtained by scientists from the Moscow University and the Institute of Soil Science and Photosynthesis, USSR Academy of Sciences, will be yielding a sizable economic effect. These mutants contain 200 times as much ubiquinone as do the yeasts being used today in the production of this medicinal preparation.

In principle, photosynthesizing microorganisms, once altered by means of genetic engineering techniques, may prove to be the energetically most feasible producers of any kind of products, including those of animal and plant origin. Great prospects are likely to open up also in the use of photosynthesizing microorganisms for commercial production of fodder and nutrient protein, for decontamination of industrial gases and sewage waters, for biodegradation of toxic substances and the treatment of pulp, molasses and other wastes.

The Soviet scientists' research has laid down a theoretical foundation for developing new microbiological technologies and highly efficient wasteless productions and has opened up a new chapter in the book of knowledge of the organisms carrying out photosynthesis—a global biological process on this planet.

UDC 579.852.11:661.184.23

Destabilization Conditions for Bacterial Dispersions

18400162 Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 88 (manuscript received 23 Feb 88) pp 71-73

[Article by G. N. Nikovskaya, A. S. Gordiyenko, L. I. Globa and P. I. Gvozdyak, Institute of Colloid Chemistry and Chemistry of Water, UkrSSR Academy of Sciences, Kiev]

[Abstract] Aqueous dispersions of bacterial cells are considered to be aggregatively stable colloid systems. The goal of the present work was to study the effect of hydrophilic-hydrophobic and electric properties of bacterial cells on aggregate stability of their dispersions. *Escherichia coli* K-12 and *Acinetobacter calcoaceticus* K-9 cultures were used as the hydrophilic and hydrophobic cultures, respectively. Bacterial aggregation was studied as a function of electrokinetic potential (EKP) and hydrophobic index in media with different pH values. It was shown that different conditions were required for destabilization of bacterial dispersions: for hydrophobic bacteria it was necessary to lower the electrostatic barrier and for the hydrophilic—both the electrostatic and

hydration barriers. These results are useful in determining regulatory measures for aggregate stability of bacterial dispersions and could be used to immobilize microorganisms in different biotechnological processes. Figure 1; references 6: 5 Russian, 1 Western.

UDC 65.012.065

Cooperation Between Enterprises of USSR Ministry of Medical and Microbiological Industry and Siberian Department of USSR Academy of Sciences

18400252f Moscow BIOTEKHOLOGIYA in Russian Vol 4 No 5, Sep-Oct 88 (manuscript received 13 Jan 88) pp 686-688

[Article by L. N. Semenova, All-Union Scientific Research Institute of Molecular Biology, Scientific Industrial Society "Vektor," Koltsovo, Novosibirsk Oblast]

[Abstract] To further improve and enhance the level of cooperation that has traditionally existed between the enterprises of the USSR Ministry of Medical and Microbiological Industry and the Siberian Department of the USSR Academy of Sciences, a Coordination Council has been established. Members of the council include top-level scientists and administrators from the ministry and the Siberian Department, as well as representatives from the Presidium of the USSR Academy of Sciences. The council has approved plans for 5 joint programs encompassing 33 individual projects intended to facilitate technology transfer from the research laboratory to the workplace. An extended meeting of the council was held on September 10-11, 1987 to address the topics of interest, which was attended by 20 scientists from 12 institutes of the Siberian Department and 40 representatives from 18 enterprises of the ministry. The major topics addressed at the meeting included development of novel medical and biological preparations, quality control in production and testing, implementation of new technologies, and environmental protection. A special bureau was established at the Coordination Council to manage day-to-day affairs between sessions of the council. The bureau has 12 members, including co-chairmen of the council Academician D. G. Knorre and corresponding member of the USSR Academy of Sciences L. S. Sandakhchiyev. The time for the next meeting of the Coordination Council has been set for September 7-9, 1988, in Novosibirsk. Information on the council's agenda may be obtained at the following address: 630090, Novosibirsk, 90, Prospekt Akademika Lavrentyeva, 8, Tel. 35-16-69.

UDC 616-006.04(083.41)

Statistical Information From USSR State Committee for Statistics

18400187 Leningrad VOPROSY ONKOLOGII in Russian Vol 34 No 9, Sep 88 pp 1049-1050

[Tables provided by the USSR State Committee for Statistics]

[Text]

Table 1. Morbidity of USSR Population Due to Malignant Neoplasms

No. Oncology Patients	Years			
	1970	1980	1985	1986
No. patients with an initially established diagnosis:				
—Absolute number, thousands	430.0	544.0	616.0	641.0
—Per 100,000 population	177.4	205.2	222.2	229.1
—Standardized indicators (M. Segi)	164.0	173.0	186.0	191.0
No. patients registered with treatment and prophylactic institutions:				
—Absolute number, thousands	1,474.0	2,226.0	2,635.0	2,730.0
—Per 100,000 population	605.0	836.0	946.0	971.0

Table 2. Morbidity of USSR Population Due to Malignant Neoplasms by Individual Locations

Localization of Malignant Tumors and Type of Neoplasm	Absolute Number (in thousands)				Per 100,000 Persons				Standardized Indicators (M. Segi)			
	Men		Women		Men		Women		Men		Women	
	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986
Total patients with malignant neoplasms	302.6	316.8	313.1	324.4	233.1	241.3	212.5	218.3	248.2	253.8	155.7	159.4
Including:												
—Oral cavity (including tongue and pharynx)	9.4	10.2	3.2	3.2	7.2	7.8	2.2	2.2	7.4	7.9	1.6	1.5
—Lip	10.4	10.9	3.1	2.7	8.0	8.3	2.1	1.8	8.4	8.6	1.4	1.1
—Esophagus	11.1	11.5	6.6	6.5	8.6	8.7	4.5	4.4	9.2	9.3	2.9	3.1
—Stomach	53.2	54.1	41.5	41.4	41.0	41.2	28.1	27.9	43.8	43.5	19.2	19.0
—Colon	11.6	12.1	15.0	15.5	8.9	9.2	10.2	10.4	9.8	9.9	7.1	7.1
—Larynx	11.6	12.4	0.8	0.8	8.9	9.5	0.5	0.5	9.0	9.5	0.4	0.4
—Trachea, bronchi, lungs	79.2	83.1	16.9	17.6	61.0	63.3	11.5	11.8	64.4	66.2	7.7	8.0
—Malignant melanoma	2.0	2.3	3.6	3.9	1.6	1.8	2.4	2.6	1.6	1.8	2.1	2.1
—Other skin neoplasms	26.2	28.5	38.4	41.5	20.2	21.7	26.1	27.9	22.0	23.3	18.0	19.1
—Mammary gland	0.4	0.4	48.7	50.5	0.3	0.3	33.0	34.0	0.3	0.2	26.4	27.0
—Cervix	—	—	26.2	25.8	—	—	17.8	17.4	—	—	13.6	13.2
—Lymphatic and hematopoietic tissue	14.9	15.6	13.1	13.8	11.5	11.8	8.9	9.3	11.9	12.2	7.4	7.8
—Other organs	72.6	75.7	96.0	101.2	55.9	57.7	65.2	68.1	60.4	61.4	47.9	50.0

UDC 616.073.916

Solid-Phase Immunosorption of Antibodies to a Specific Antigen of the Brain From Rat Blood With Experimental Breach of the Blood-Brain Barrier

18400160c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 302 No 6, Oct 88 pp 1511-1513

[Article by V. P. Chekhanin, USSR Academy of Medical Sciences Member G. V. Morozov, T. A. Cherkasova, Yu. A. Leykin, Chemical and Technological Institute imeni D. I. Mendeleyev; Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, Moscow]

[Abstract] Most brain proteins are autoantigenic, which means that their entry into the blood sensitizes lymphocytes and later causes the formation of antibodies. Although the participation of autoantibodies in the pathogenesis associated with such processes is unquestionable, the highly selective removal of autoantibodies to brain antigens from the blood remains an open question. In rats, the researchers model a breach of the blood-brain barrier accompanied by the release of brain α_2 -glycoprotein into the blood and subsequent antibody formation. They remove antibodies to the α_2 -glycoprotein from the blood serum by means of solid-phase immunosorption (with an immunosorbent produced by the covalent binding of the α_2 -glycoprotein and a porous solid polymer carrier) and explain when this procedure is advisable (immunosorption is often followed by a rapid increase in the levels of the antibody being removed, which limits the practical application of the method as a means of immune correction). The immunosorption method they use is said to effectively seal the blood-brain barrier until it becomes functional. One figure, 13 references: 3 Russian, 10 Western.

UDC 612.82/83:612.017.1

Effect of Immunoactive Substances on the Sensitivity of the Retina to Light

18400161c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 1, Nov 88 pp 249-251

[Article by V. V. Abramov, V. G. Bezgachev, N. Yu. Gromikhina, A. Ts. Batoyeva, V. S. Kozhevnikov, V. B. Volkov, G. M. Sychev, V. P. Krylov, and V. A. Kozlov, Institute of Clinical Immunology, Siberian Department, USSR Academy of Medical Sciences, Novosibirsk]

[Abstract] Proceeding from the assumption that neuropeptides can be mediators in the interaction between the immune system and the nervous system, the authors used a model of the action of immunoactive substances (IL-1, T-activin, and B-activin) on the retina to study the possibility of their effect on the endings of sensitive nerves. The perception of light signals was assumed to change when acted upon by the substances, an effect that can be measured with an electroretinogram (ERG). The

effect produced by the substances on the visual analyzer could be termed "analgesic," like the effect produced by endorphins on other afferent analyzers. T-activin and IL-1 lowered ERG amplitude 5-30 minutes after the beginning of the recording. B-activin did not have a consistent effect on the retina's perception of light. A second set of experiments implied that the effect produced by the immunoactive substances can be mediated by the B-endorphins that are part of their make-up. The authors conclude that the effect of the immunoactive substances on the nerve endings may serve as the basis of one means of activating the nervous system via the immune system. One figure, 12 references: 7 Russian, 5 Western.

UDC 617-001.4-002.3-002.7-085.276.4-036.8-07:
617-001.4-003.9

Effect of Immunoregulatory Preparation on Dynamics of Purulent Wound Healing

18400168 Moscow ARKHIV PATOLOGII in Russian Vol 50 No 9, Sep 88 (manuscript received 17 Nov 87) pp 28-34

[Article by A. Z. Guseynov, Department of Pathological Anatomy (Director: Professor V. S. Paukov), 2nd Therapy Faculty, 1st Moscow Medical Institute imeni I. M. Sechenov]

[Abstract] The goal of this study was to elucidate the immune mechanism and its role in the dynamics of the wound healing process; effect of immunoregulating reagents (T-activin, prodigiosan, and levamisole) on healing of purulent wounds was studied on patients and rats. Clinical study included 59 patients, 17 to 61 years old; the control group was treated surgically, symptomatically and with antibacterial agents; the three study groups included above procedures and, in addition, treatment with above immunoregulators was added. Cytological and histological examinations and results of animal experiments gave similar results. Immunity stimulation, especially the cellular immunity had a definite effect on the course of purulent inflammation. T-activin stimulated the immune system as a whole, prodigiosan affected the hypophysis-adrenal chain and levamisole stimulated activity of T-lymphocytes and neutrophils. In all cases reparative processes in purulent wounds were accelerated. Figures 3; references: 12 (Russian).

UDC 615.362.438.017:615.275.4].015.4:
612.017.1].076.9

The General and the Specific in the Action of Tactivin and Myelopid on the Immune System of Intact Mice (A Morphometric Analysis)

18400190c Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 88 pp 44-48

[Article by D. P. Lindner, O. N. Stetsenko, and L. V. Talanova, Second Moscow Medical Institute imeni N. I. Pirogov]

[Abstract] Having found in earlier experiments that high concentrations of the Soviet preparations of tactivin and myelopid have a stimulating effect on the entire immune

system in intact mice, the researchers compared the effects of each preparation to establish the general features and the specific features of each. In one experiment, they administered a single subcutaneous injection of 0.5 µg tactivin to F₁(CBAXB57BL/6) mice, and in another, they did the same with 200 µg myelopid. Thymocyte generation—multiplication in the cortex, intraorgan migration toward cortical matter and phenotypical maturation of T-cells, transition to a more mature population of cortical thymocytes, and emigration through vessels of the corticomedullar junction—was analyzed. Thymus mass, parenchymal area and area of cortex and cortical matter, and number of pyknoses remained stable with both preparations, which were judged to cause mild functional stress in the thymus. Tactivin produced prolonged lymphopenia in the brain, with a two-peak lymphocytosis of peripheral blood. With myelopid, lymphocytosis was stable, with a stable enhancement of overall mitotic activity in the brain. Both preparations were found to stimulate the effector component of humoral immunity, enhancing proliferation and differentiation of cells in the plasma-production fields of the spleen, against a background of structural changes in all sectors of the immune system. The ultimate effects produced by tactivin were mediated by stimulation of the generation and emigration of thymocytes, the emigration of brain lymphocytes, and the mobilization of memory cells from germinative centers. Myelopid's effects were mediated by excitation of both the central and the peripheral generation of B-cells. Three figures, 16 references: 7 Russian, 9 Western.

UDC 7-06:616.94-022.7:579.861.2]-092:612.017.
1.014.46:[615.276.4:577.175.82]

Immunomodulating Activity of Myelopid in Staphylococcal Sepsis From a Thermal Burn
18400190d Moscow IMMUNOLOGIYA in Russian
No 4, Jul-Aug 88 pp 87-88

[Article by N. A. Gordinskaya, Gorky Scientific Research Institute of Traumatology and Orthopedics]

[Abstract] Enhancing the body's immune response in burn-related trauma is of great import, since infectious complications are the main cause of death in burn victims. The researcher studied the effect of myelopid—a preparation based on myelopeptides, which stimulate the development of antibodies of populations of mature plasmacytes when antibody formation is at a low level in the immune system—on immune response in mice with burns that were complicated by experimentally induced staphylococcal sepsis. A 50 µg injection of myelopid was found to increase the number of antibody-forming cells, their levels being three times higher than in mice who were not administered myelopid. The preparation also affected survival rate, with 45 percent of the mice who

received myelopid still alive on the fifth day after infection, as opposed to 3 percent among those who had not received myelopid. Two figures, 9 references: 4 Russian, 5 Western.

UDC 577.112.083.3:615.371

Antigenic Structure of Foot-And-Mouth Disease Virus. I. Synthesis of Protective Peptides From a Sequence of the Basic Immunogenic Region of the VP₁ Protein of the O₁K Strain of the Foot-And-Mouth Disease Virus
18400243a Moscow BIOORGANICHESKAYA KHIMIYA in Russian
Vol 14 No 10, Oct 88 pp 1352-1362

[Article by A. Yu. Surovoy, O. M. Volpina, Ye. V. Snetkova, T. D. Volkova, V. T. Ivanov, A. V. Chepurkin, V. N. Ivanyushchenkov, A. N. Burdov, and N. N. Dryagalin, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Food-And-Mouth Disease, Vladimir]

[Abstract] The researchers used synthetic peptides to study approaches to the creation of a synthetic vaccine against foot-and-mouth disease. The creation of synthetic peptide vaccines against the disease has gathered interest in the scientific community because, among other things, the agent of the disease—an RNA-containing virus—belongs to a large family of viruses that are the agents of diseases like hepatitis A and poliomyelitis. The capsids of the viruses are similar, which makes it possible to extrapolate certain data from one virus to another and to use approaches to creating a vaccine against foot-and-mouth disease as a model for creating other antiviral vaccines. The researchers studied an O₁K laboratory strain whose VP₁ protein has 213 amino acid residues. To localize the antigenic and immunogenic activity in the main immunogenic region of the protein, the researchers synthesized overlapping fragments of the 136-159 region. To study the immunogenic properties of the synthetic peptides, they produced KLH conjugates. The immunogenicity of all the peptides that showed activity as a KLH conjugate were also studied without a carrier-protein, in a free state. The activity of preparations based on the synthetic peptides was studied in guinea pigs. The experiment showed peptide 145-159 to be completely inactive. The 136-152 region showed the highest activity, with the free peptide providing 100 percent protection against the disease. Peptide 136-148 provided a 50-60 percent protective effect. The free 136-148 peptide and its KLH conjugate showed activity similar to 136-152. The 141-148 and 141-152 peptides did not protect the animals from the disease. The researchers posit that the 136-152 peptide includes not only a B-epitope, which ensures the development o

virus-neutralizing antibodies, but also a T-epitope, which replaces the action of the carrier protein. Figures 4, references 14: 2 Russian, 12 Western.

UDC 577.112.083.3:615.371

Antigenic Structure of Foot-And-Mouth Disease Virus. II. Synthesis of Protective Peptides From a Sequence of the Basic Immunogenic Region of the VP₁ Protein of the A₂₂ Strain of the Foot-And-Mouth Disease Virus

18400243b Moscow BIOORGANICHESKAYA

KHIMIYA in Russian

Vol 14 No 10, Oct 88 pp 1363-1371

[Article by O. M. Volpina, A. Yu. Surovoy, V. V. Ulyashin, V. T. Ivanov, A. V. Chepurkin, V. N. Ivanyushchenkov, A. N. Burdov, and N. N. Dryagalin, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Food-And-Mouth Disease, Vladimir]

[Abstract] Synthetic peptides that model the protective epitopes of various viruses are of interest to researchers because of the promise they hold in the creation of

synthetic antiviral vaccines. Most of the success achieved in inducing an antiviral immune response in laboratory and naturally susceptible animals with synthetic peptides has been with the foot-and-mouth disease virus. Study of the immunogenicity of synthetic peptides that protect against foot-and-mouth disease, however, has traditionally been associated with the O, K strain; whereas naturally occurring strains are of the greatest practical interest. The researchers here localized and synthesized protective fragments of the surface VP₁ protein of the A₂₂ strain of the foot-and-mouth disease virus. They perform a theoretical analysis of the VP₁ protein and present graphic representations of the hydrophilicity, acrophilicity, and antigenicity profiles, as well as probable α -spiral segments and β -bends. The 131-149 segment was targeted because the most probably antigenic determinants of the primary immunogenic region are found there. The protective properties of the various synthetic peptides were studied in guinea pigs. Immunization with the KLH-conjugate of peptide 131-149 and with free peptides 131-149 and 140-149 resulted in a 50-80 percent protection of the animals. The N-terminal fragment of 131-139 region and the 90-98 fragment showed no protective activity. Figures 6, references 10: 3 Russian, 7 Western.

UDC 613.632:576.75

Methodological Aspects of Evaluation of Body Reaction to Action of Chemical Agents
18400169 Kiev VRACHEBNOYE DELO in Russian
No 8, Aug 88 (manuscript received
11 Jun 87) pp 101-104

[Article by I. G. Kopeyka, Division of Protection of Atmospheric Air From Pollutants (Director: I. Ya. Sigal), Institute of Gas, UkrSSR Academy of Sciences, Kiev]

[Abstract] Reaction of organisms [rats] to combined effects of inhaled chemicals was investigated on functional models (regression analysis of a series of variables). It was noted that the linearity of the model depended on the functional role and meaning of the

change in specific indicators on the stability of the organism. Regression equations were similar for similar indices of even different substances. The model retained its applicability for the duration of all experiments. Linear effects of individual indices varied from experiment to experiment. Regression analysis of non-dimensional partial reactions made it possible to determine general characteristics of the organism reaction to the action of chemicals at low and high concentrations, different exposure periods and different reagents. Some indices were shown to be highly variable but not labile, some less variable but more labile, highly labile but not variable, etc. Thus it was shown that results of partial reactions should not be extrapolated freely to the entire organism without a thorough analysis of the mechanism of systemic organization of partial reactions in different equation systems. References: 8 (Russian).

UDC 615.849.19.015.4:[616.155.1-018.1:576.314]
-008.1

External Sodium and Potassium Cotransport In Erythrocytes Upon Exposure to Helium-Neon Laser Radiation

18400170a Moscow GEMATOLOGIYA I
TRANSFUZIOLOGIYA in Russian Vol 33 No 9 Sep 88
(manuscript received 21 May 87) pp 31-35

[Article by Professor Ye. N. Panasyuk, A. M. Moroz and I. D. Tsyupko, Lvov Medical Institute]

[Abstract] The aggregation and hemolysis of erythrocytes irradiated with monochromatic red light and their diminished capacity to withstand the damaging effect of hemolitics point to the structural and functional activity of the light. In an earlier work, the authors showed that exposure of erythrocytes to monochromatic red light resulted in a sharply reduced K^+ / Na^+ index, modulated Na^+ and K^+ -ATPase activity, and enhanced active Na^+ transport. In an attempt to verify the notion that the redistribution of cations induced by monochromatic red light was the result of changes not only in the transport of Na^+ mediated by a sodium pump, but also by other routes, the researchers sought to explain here the degree to which ouabain-resistant furosemide-dependent Na^+ / K^+ cotransport flows of erythrocytes are involved in the shifts in electrolyte balance. Studies were made of processes tending to maintain constant ion composition on both sides of the membrane of erythrocytes exposed to monochromatic red light generated by a helium-neon laser. The results of the experiment indicate that monochromatic red light primarily influences the outflow of K^+ , the concentration of which in the external medium increases even when 0.1 mM ouabain and 0.5 mM furosemide are present. Furosemide suppressed the release of Na^+ to a lesser extent in erythrocytes exposed to monochromatic red light for 5 and 10 minutes than in cells not exposed to laser radiation. The results indicate that the active transport mechanism is not involved in cation redistribution in cells exposed to laser radiation. Figures 2, references 14: 6 Russian, 8 Western.

UDC 616.33-089-059:615.831.72-06.001.86

Direct Results of Use of CO₂ Laser In Gastric Surgery

18400170b Leningrad VESTNIK KHIRURGIYI IMENI I. I. GREKOVA in Russian Vol 141 No 8 Aug 88
(manuscript received 02 Mar 87) pp 123-125

[Article by Yu. I. Kalish, A. M. Postolov, V. M. Vorozheykin, A. G. Shitov and U. Ergashev, Tashkent Branch, All-Union Scientific Center for Surgery, USSR Academy of Medical Sciences]

[Abstract] The Scalpel-I laser unit was used successfully in 73 gastric operations of varying nature performed at the All-Union Scientific Center for Surgery in 1985-1986. It was also used to advantage in operations involving resection or removal of adrenal glands; intervention

for echinococcosis of the lungs, liver, or the abdominal cavity; cholecystectomy; and esophagoplasty. The major advantages of the laser scalpel include its hemostatic properties, the "welding" of the layers of the stomach and intestine at the location of the cut, and its ablative and aseptic properties. The number of hemorrhages into the lumen of a hollow organ or into the free abdominal cavity was greatly reduced. Postsurgical suppuration and complications were less frequent. The hemostatic properties of the laser scalpel were especially useful in reconstructive operations involving organs of the abdominal cavity. Results of expanded subtotal stomach resection by laser in 19 individuals were compared with the results noted in a control group of 100 individuals whose surgeries were performed with traditional methods. Complications were noted in 14 of the 100 and in 3 of the 19. Postoperative wound suppuration, which was observed in 10 patients of the control group, was not observed in any of the laser-surgery patients. The laser-surgery patients experienced less pain in the post-op period, the stomach's evacuatory capability returned more quickly, and intestinal peristalsis appeared sooner. Endoscopy of 55 patients following surgery for noncancerous gastric disease revealed less frequent inflammation in the area of anastomosis. Histologic examination revealed less edema of the stroma and a lower level of lymphoendothelial infiltration. References 3: Russian.

UDC 616.33-018.7-091-085.849

Effects of Helium-Neon Laser on Ultrastructure and Proliferation of Gastric Epithelium

18400178b Tashkent MEDITSINSKIY ZHURNAL UZBEKISTANA in Russian No 8, Aug 88 (manuscript received 29 May 85) pp 74-77

[Article by E. Sh. Musayev, I. M. Baybekov and T. U. Arslanbekov, Tashkent Branch, VNTsKh [not further identified], USSR Academy of Medical Sciences]

[Abstract] The extensive clinical application of the helium-neon laser in the management of gastric ulcers has led to an experimental study of the effects of this type of irradiation on morphology of the gastric epithelium. The experimental studies were conducted with 120-130 g male Wistar rats, with both the serosal and the mucosal sides of the epithelium subjected to irradiation from a LG-52 or LG-75 instrument delivering 6 to 33.90 J/cm² to a 3 mm diameter target area for 1-5 min. Measurements of ³H-thymidine uptake to monitor mitotic activity demonstrated that, in general, irradiation of either side led to a maximum 2.5-fold increase in the proliferative activity of the gastric epithelium in a dose-dependent fashion. In addition, the ultrastructural studies confirmed laser-induced enhancement of secretory and excretory activity of the epithelium. Both factors or end results of helium-neon laser irradiation of the gastric epithelium are consonant with the therapeutic efficacy observed in the clinical setting. Figures 4.

UDC 616-089.168 I-06-072.1.849.19

Endoscopic Laser Therapy in Preoperative Prep Work and in Prevention of Postoperative Complications

18400181a Kiev KLINICHESKAYA KHIRURGIYA in Russian No 8, Aug 88 pp 39-40

[Article by A. G. Khasanov, I. M. Urazbakhshin, A. N. Rezbayev, Department of Surgical Diseases No. 2, Bashkir medical Institute imeni 15-letiya VLKSM, Ufa]

[Abstract] In peptic ulcer of the stomach or the duodenum, the degree of inflammation of the mucous membrane revealed by endoscopy depends on the markedness of the inflammatory process around the ulcer found during surgery. The presence or absence of inflammatory alterations in the surrounding tissue can be judged on the basis of the severity of the inflammatory changes of the mucous membrane. Endoscopy identifies three degrees of inflammation of the mucous membrane, the first being the mildest, the third being the most severe. In the third degree, the entire membrane of the pyloroduodenal area is severely edematous and is bright red. The folds do not respond to insufflation, and there are multiple erosions. Antiperistaltic contractions in the region of the pyloric sphincter and pronounced gastroduodenal reflux are not unusual. The mucous membrane either fragments poorly in biopsy or does not fragment at all. Inflammatory infiltration of all the stomach-wall or duodenum-wall membranes around the ulcer is always found during surgery in the second and third degrees. The authors used endoscopic laser therapy during preoperative prep work in 127 individuals with peptic ulcer of the stomach (14) or duodenum (113). The patients underwent a five-minute treatment session once a day or every other day, with the number of sessions depending on the degree of the inflammation. One or two sessions generally reduced the pain and eliminated dyspepsia. Edema of the mucous membrane diminished, and the ulcer was cleansed of necrotic tissue. Third-degree inflammation was arrested in 68 patients after 5-6 sessions; second-degree inflammation, in 39 patients, after 3-4 sessions; first-degree inflammation, in 20 patients, after 2-3 sessions. The motor evacuatory function of the stomach was usually normalized, biopotential amplitude reduced, and frequency of stomach contractions decreased. The authors conclude that endoscopic laser therapy is an effective preoperative treatment and helps to reduce the pre-op prep time needed for most patients and reduce postoperative complications.

UDC 616.33/.342-002.44-07-08

Endoscopic Laser Therapy of Ulcers of the Stomach and the Duodenum

18400181b Kiev KLINICHESKAYA KHIRURGIYA in Russian No 8, Aug 88 pp 63-64

[Article by G. A. Romanov and A. I. Kovalev, Moscow Oblast Scientific Research Clinical Institute imeni M. F. Vladimirovskiy]

[Abstract] Helium-neon lasers (LG-38 and LG-75) operating at a wavelength of 632.8 nm were used through a gastrofiberscope to treat stomach ulcers (in 45 individuals)

and duodenal ulcers (in 41). The treatment was combined with pathogenetic therapy for peptic ulcer. Medicinal therapy lasting two months or longer had been ineffective in 36 of the patients, in 12 of whom surgery was contraindicated because of severe accompanying disease. The laser radiation was delivered directly through a fiberoptic endoscope or, with a specially developed intermediate focusing device, through a 400-μm-diameter quartz monofilament with a power of 12 mW at the output end of the filament. The patients underwent three treatment sessions a week, for a total of 3-13 sessions. The average number of sessions was 5-6. With as few as 1-2 sessions, pain diminished, general state of health improved, and sleep and appetite normalized. Endoscopy revealed that the inflammatory torus either diminished or disappeared, the bottom of the ulcer was cleansed of necrotic tissue, and the fibrin was translucent. The ulcers healed, as a rule, via epithelialization or the formation of a tender scar. Long-term studies of the treatment results (up to 3 years) revealed recidivism in 10.4 percent of the patients—a surface ulcer that was removed with 2-3 radiation sessions. The technique is considered extremely effective for local endoscopic treatment of peptic ulcers of the stomach and duodenum.

UDC 616.342-002.44-08+615.849.19

Using a Copper-Vapor Laser in the Complex Treatment of Peptic Ulcers

18400181c Kiev KLINICHESKAYA KHIRURGIYA in Russian No 8, Aug 88 p 64

[Article by A. I. Soldatov, V. B. Matyushichev, and V. V. Titov, Baltic Central Clinical Basin Hospital imeni G. I. Chudnovskiy, Scientific Research Institute of Physiology imeni A. A. Ukhomskiy of the Leningrad State University imeni A. A. Zhdanov]

[Abstract] The researchers used the green-yellow light of a copper-vapor laser—an MD-102 unit based on the series-produced ILGI-101 source—to treat stomach and duodenal ulcers in 78 individuals who were also being treated medicinally. The sessions, which lasted 10 seconds, were usually held every other day, in either a hospital or a polyclinic. The ulcers healed in all the patients, and the scarring took place generally without deformity of the organ. To heal, the duodenal ulcers required 1-13 sessions of laser therapy over 9-10 days. The acute duodenal ulcers epithelialized in 2-14 days; the chronic duodenal ulcers, in 2-20 days; and the multiple ulcers, in 7-30 days. The course of treatment for stomach ulcers consisted of 2-7 sessions, over a period of 6-21 days. Treatment of erosive bulbar ulcers required, roughly, two sessions over a period of about five days; acute duodenal ulcers, 2-4 sessions over 6-9 days; acute stomach ulcers, 2-4 sessions over 7-11 days; and multiple duodenal ulcers, 5-7 sessions over 10-16 days. The

researchers consider the copper-vapor laser to be superior to other lasers in the treatment of peptic ulcers, because of its wide range of use.

UDC 617.7-005-02:615.849.19]-092.9

Effects of Defocused Laser Beam on Ocular Circulation in Rabbit

18400182b Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 4, Jul-Aug 88 (manuscript received 12 Nov 87) pp 70-72

[Article by Yu. D. Berezin, A. V. Borisov and I. N. Ushkova, Laboratory of Labor Hygiene, Scientific Research Institute of Occupational Diseases, USSR Academy of Medical Sciences, Moscow; Chair of Human Anatomy, Leningrad Sanitary Hygiene Medical Institute]

[Abstract] The finding that low-intensity laser irradiation of the rabbit eye leads to enhanced blood flow in that organ led to the present study to define more closely the effects of a defocused helium-neon laser beam on ocular circulation. The study was conducted with male chinchilla rabbits under the following conditions: corneal exposure to 1.7×10^{-2} J/cm² or 2.5×10^{-3} J/cm² laser beam covering a 6 mm diameter spot. The treatments were continued on a daily basis for 120 days with periodic rheophthalmographic monitoring and histologic examinations. The circulatory responses were passive in nature: depending on the energy dose, an increase blood flow was observed on the 10th day, a moderate decrease on the 20th day, significant increases on the 30th and 60th days and diminished flow on the 120th day of the experiment that persisted for the following 30 days. Histologic changes were unremarkable, except for slight vasodilatation that abated during the recovery phase. The mechanisms responsible for the circulatory changes evoked by irradiation with the 0.63 nm laser remain to be defined. Figures 1; references 7 (Russian).

UDC 612.112.94.017.1-06:615.849.19

Experimental Study of the Effect of the Radiation of Helium-Neon and Arsenide-Gallium Lasers on the Rosella-Forming Function of Lymphocytes of the Peripheral Blood

18400190e Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 88 pp 88-89

[Article by O. V. Milovanov and A. R. Yevstigneyev, Kaluga Oblast Hospital No 2; Kaluga Radiotube Plant imeni 50-letiya SSSR]

[Abstract] The researchers studied the effects of the radiation of the LG-75 helium-neon laser and the Uzor arsenide-gallium laser on individuals with psoriasis, chronic bronchitis, or ischemic heart disease. The LG-75 increased the total percentage of rosella-forming cells in 3 out of 7 individuals, the Uzor in 6 out of 7. The Uzor

laser was found to have a greater effect on the expression of E-receptors on T-cells, which implies an elevation in functional potential. The researchers concluded that use of a pulsed, semiconductor laser in the near-IR range is preferable, because its stimulating effects are achieved at substantially lower power. Five references (Russian).

UDC 617.7-057-02:613.648]-07

Body's Response to Irradiation of the Eye With a Low-Intensity Near-Infrared Laser

18400231a Moscow GIGIYENA TRUDA I PROFESSIONALNYE ZABOLEVANIYA in Russian No 10, Oct 88 pp 12-16

[Article by V. A. Kashuba, N. F. Shaposhnikova, E. N. Lavrova, N. E. Agayev, and A. V. Cherkasov, Scientific Research Sector, Moscow Medical Stomatological Institute imeni N. A. Semashko]

[Abstract] Many fields of science, technology, production, and medicine have begun to use low-energy near-IR emissions generated primarily by semiconductor lasers at about 10 mW. Neither the biological effects of these emissions, however, nor the mechanisms of such effects are clearly understood. The researchers undertook a study of not only local responses of the body to irradiation of the eye with a low-intensity near-IR laser, but also the possible overall responses of the body. They used a DL-103 type 32 semiconductor CW laser with 2.6 mW of power and operating at $\lambda = 0.80-0.87 \mu$ to irradiate the eyes of 24 rabbits. Between 30 minutes to three hours after a 5-minute irradiation, a consistent reduction in intraocular pressure was observed in the irradiated eye. Similar results were obtained after a 20-minute irradiation period. During the first minute of the 20-minute irradiation period, the pupil of the eye contracted to a diameter of 6.5 mm plus or minus 0.21 mm (from 8.2 plus or minus 0.14) and remained roughly the same for the entire period. Expansion began 30 seconds after irradiation ceased and continued for about 10 minutes. Functional changes in the eye after five minutes of irradiation were accompanied by activation of processes of aerobic oxidation and, primarily in the corneal epithelium, elevated glutamate dehydrogenase activity. Such changes were essentially the same when irradiation was extended to 20 minutes. The effects observed in all the experiments were also found in the left (unirradiated) eye, which may have been due not only to oculo-ocular effects, but also to indirect irradiation. Systemic response to the irradiation included short-term elevation of arterial pressure and changes in the frequency of heart contractions and respiration. Enzymatic shifts occurred in the neurons of the visual cortex of the brain in both hemispheres, pointing to aerobic oxidation processes. The researchers conclude that irradiation of the eye with low-intensity near-IR laser emissions produces a response in the structures of the eye, as well as physiological and metabolic changes in other organs and systems. The sympathetic nervous system, the parasympathetic nervous system, and, the researchers feel, probably

the neurohormonal system (because of the link between the eye and the hypothalamus and the epiphysis) take part in the mechanisms of the changes. Four figures, 11 references: 10 Russian, 1 Western.

UDC 617.715.085.849.19-036.8-07.617.725-091

Morphological Study of the Ciliary Body in Contact Transciliary Laser Cyclocoagulation on Human and Rabbit Eyes

18400239a Moscow VESTNIK OFTALMOLOGII in Russian Vol 104 No 5, Sep-Oct 88 pp 11-13

[Article by M. M. Krasnov, professor, USSR Academy of Medical Sciences academician; L. P. Naumidi, candidate of physical and mathematical sciences; and A. A. Fedorov, candidate of medical sciences; All-Union Scientific Research Institute of Eye Diseases, USSR Ministry of Health, Moscow]

[Abstract] Experimental and clinical studies indicate that a new laser method for treating primary open-angle glaucoma—contact transciliary laser cyclocoagulation—is effective in reducing intraocular pressure. The researchers took the first step in the morphological substantiation of the optimum parameters of the laser treatment by studying the pathomorphological aspects of the interaction between the laser emissions and the tissues of the ciliary body and the sclera of human and rabbit eyes in a transciliary intervention that used fiber-optic means of delivering the laser beam to the site of the intervention. The experimental unit used in the intervention is described by Akopyan *et al.* (KVANTOVAYA ELEKTRONIKA, 1987, Vol 14, No 6, pp 1291-1298). The working parameters of the intervention, however, had a wider energy range (0.2-5 J) than did those used by Akopyan. The duration of exposure to the laser emissions was, as with Akopyan, stepped, from 8.9 msec to 320 msec. The experiments here were performed on the eyes of 20 rabbits and two humans enucleated for a tumor just before the operation. In three rabbits, enucleation was performed four days after the laser treatment; in three others, a week after the procedure; and in the rest, a half hour after the procedure. The researchers concluded that bleeding points on the surface of the coagulate were of a diapedetic nature. Around certain vessels there was marked perivascular infiltration, primarily macrophage with isolated plasmacytes and lymphocytes. Structural changes of the tissue of the ciliary body in the region of the coagulate included, primarily, destruction of the collagen matrix and its fragmentation into globular structures and fragments of short collagen fibers. The epithelium of the ciliary body in the region of the coagulate, owing to the presence of pigment-containing structures, suffers complete destruction, with the formation of broad defects in neighboring ciliary processes. The rabbit data was used to predict post-operative changes in the ciliary body of the human eyes. The

pathomorphological data indicate that it is possible to localize the effect of the laser destruction of the ciliary body in a predetermined area. Four figures, 4 references: 3 Russian, 1 Western.

UDC 615.849.19.03:617.73].076.9

Comparative Pathomorphological Study of the Action of Continuous-Wave Laser Emission of Varying Spectral Composition on the Fundus Oculi of a Rabbit

18400239b Moscow VESTNIK OFTALMOLOGII in Russian Vol 104 No 5, Sep-Oct 88 pp 61-67

[Article by A. V. Bobishunov, G. G. Zangirova, A. V. Kalinkin, and A. A. Fedorov, All-Union Scientific Research Institute of Eye Diseases, USSR Ministry of Health, Moscow]

[Abstract] Earlier reports on attempts at coagulating the tissue of the fundus oculi with the second-harmonic CW emissions of a YAG laser lacked information involving comparative pathomorphological studies that took into consideration the absolute identification of the energy parameters associated with the generation of emissions of a different spectrum in a given range of wavelengths. The purpose of the researchers here was to conduct a comparative study the foci of damage to the microstructures of the chorioretinal complex with focused CW laser emissions of varying spectral composition: pure green ($\lambda = 0.532 \mu$) second-harmonic radiation of a YAG laser; blue-green ($\lambda = 0.488-0.514 \mu$) of an argon laser; and pure green ($\lambda = 0.514 \mu$) of an argon laser. The experimental ophthalmological laser unit consisted of a CW YAG laser with frequency doubling of the emissions at the wavelength of 0.532μ in continuous-wave mode and a Model-41 argon laser ophthalmocoagulator (Laser Tek OY, Finland). The experimental animals were 15 gray chinchilla rabbits divided into three groups, according to the wavelength of the laser emissions. In the morphological picture of all the damage found in the three groups, the researchers were able to delineate an area of coagulation necrosis caused, apparently, by heat in the area absorbing the highest energy, as well as a region of steam formation and destruction. When the argon laser was used, the thermal energy was released primarily at the level of the pigment epithelium. Coagulation traction of the latter led to detachment of its healthy segments along the periphery of the coagulant. When the YAG laser was used, the most heat damage was behind the pigment epithelium, in the choriocapillary layer, to some extent in the mid-caliber vessels. The area of steam formation, however, was apparently limited to the photoreceptor layer. Thermal-energy damage was also found toward the choroid. Second-harmonic YAG laser emissions at 0.532μ were found to offer greater selectivity in terms of the effect on melanin-containing structures and erythrocyte hemoglobin. Two figures, 5 references: 1 Russian, 4 Western.

UDC 591.484

Topographic Organization of the Ganglionic Layer of the Retina of the Amazon Dolphin *Inia geoffrensis*

18400161a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 303 No 1, Nov 88 pp 219-222

[Article by A. M. Mass, A. Ya. Supin, and V. V. Popov, Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] The habitat of some freshwater dolphins—turbid water—has left its mark on the morphology of their visual system. The researchers used five complete retina specimens from *Inia geoffrensis*—dolphins that live in the middle reaches of the Ucayali River, a tributary of the Amazon River—to map the topographic distribution of the density and size of ganglionic cells in the retina. The average area of retina was found to be 100 mm², with the average number of ganglionic cells at 14,900, and the average density at 150 per square

millimeter. The greatest density of ganglionic cells (more than 300-400/mm²) was observed in an unusual place—a portion of the lower sector of the retina. The ganglionic cells were rather large: 10-38 µm, with some neurons as large as 40-42 µm. No correlation was found between cell size and density of distribution. Large ganglionic cells are apparently typical of cetaceans. Two cell populations can be determined on the basis of histological criteria: the main mass, with cells 10-40 µm in size, with lightly tinted cytoplasm and lighter, large nuclei; and a mass with considerably fewer cells, consisting of dark neurons 20-40 µm in size, with dark-tinted cytoplasm and large, lighter nuclei. The histogram of distribution by size was, nevertheless, monomodal. The density of cells in the Amazon dolphin retina is lower than usual, even in the area of its maximum, suggesting low visual resolution, which may be adequate for vision in turbid water, where only relatively large objects can be differentiated, and then only close up. The existence of such a specialized area of the retina suggests the possibility that the Amazon dolphin uses it to perceive visual images. Two figures, 15 references: 2 Russian, 13 Western.

New Method for Treating Far-Sightedness
18400274 Moscow SOVIET UNION in English
No 12, Dec 88 p 46

[Article by Sviatoslav Fedorov, General Director of the Intersectoral Scientific and Technological Complex of Eye Microsurgery, Moscow, Corresponding Member of the USSR Academy of Sciences and Academy of Medical Sciences]

[Text] As is known, with far-sightedness (scientifically termed hypermetropia) rays of light focus behind the retina, and the person perceives the image of objects dim and blurred. The purpose of surgery is to change the optical power of the cornea to enable it to focus the rays precisely on the retina.

The operation is conducted like a medical procedure in the out-patient department. An analgesia is first instilled into the patient's eye. The scheme of the operation is then plotted on the eye with a special paint. The instrument allows the depth, temperature and duration of the action to be controlled. Its tip reaches the lower corneal layers, and in one or two-tenths of a second a heat pulse is transmitted to the surrounding tissues. Under the action of thermal energy the collagen molecules (the protein the cornea is composed of) curl and shrink.

As a result, the cornea gradually contracts peripherally and becomes more convex in the center, causing its optical characteristics to change in the right direction. The effect is not long in coming.

After the operation a bandage is applied to the eye for a day, and for the following two or three weeks disinfectant drops are instilled. By the end of these procedures the improvement is obvious. For instance, in patients with monocular hyperopia having an eye glass-aided acuity of 10 to 20 per cent it increases, depending on age, to 40-70 per cent even without glasses.

Our main objective is to help the patient do without corrective lenses altogether. Those with strong far-sightedness have to wear thick glasses and even to keep several pairs at a time to see objects at different distances. Such patients quickly get tired under visual strain and complain of headaches and dizziness. Besides, with certain complications (amblyopia-functional impairment of acuity, disturbance of binocular vision, etc.) even glasses are unable to fully correct vision.

Patients with monocular hyperopia make up a particular category. One of their eyes is normal, and they usually do not wear spectacles. In such persons the acuity of the affected eye deteriorates ever more strongly.

Neither is the application of contact lenses as a method of visual correction free of drawbacks. Often they do not wear well, and in some occupations they cannot be used at all. Implantation of lenses directly into the cornea is both a complicated and traumatic methods.

The over 2,000 operations performed at our clinic are most indicative of the advantages of our method. Many of our former patients ave stopped wearing glasses. After seven years of observation we found that the method had passed the test of time and was free of complications. Such an operation can be recommended for any person between the age of 18 to 60 wearing glasses of plus-one to plus-eight diopters.

In parallel with thermal action we also tested a laser method. it was also effective in treating far-sightedness. Apart from Moscow, both methods will be practiced in 14 other cities where we have or will have our branches.

The new technique has aroused interest among foreign specialists. The equipment and instruments for this kind of surgery have been patented in the US. Talks are under way with American firms for selling a licence for our method.

Today, both near-sightedness (keratotomy, an operation in which a series of incisions are made in the cornea with a diamond scalpel) and far-sightedness of mild and moderate severity can be eliminated by acting upon the cornea. It is our aim to extend the range from minus 15 to plus 15 diopters. Every person at about the age of 20 (the time for choosing an occupation) will then be able to correct his or her vision and do without eyeglasses.

UDC 61:519.85

Use of Problem-Independent ("Empty") Expert Systems in Medicine

18400186a Moscow VESTNIK AKADEMII MEDITSINSKIH NAUK SSSR in Russian
No 7, Jul 88 pp 76-79

[Article by F. V. Ballyuzek, M. I. Polyakov and Ye. V. Dobrynin]

[Abstract] A philosophical approach was taken to the implementation of expert systems in medicine in order to overcome the underutilization of such computer systems in medicine. In part, the difficulties entailed in the use of expert systems in the USSR and abroad are due to inherent problems pertaining to standardization and the creation of a highly structured approach suitable for fitting medical data to computerized data processing. Beginning in 1982 a system was started for training and reinforcing surgical skills and has since been expanded into an expert program for conducting state examinations in medicine. The basic approach consists of utilizing the flexibility in problem-independent ('empty') expert systems to create a dialogue-based approach to computer assisted training, diagnosis, patient monitoring and consultation, screening, and prognostic programs that may be varied at will to accommodate new data. References 9 (Russian).

UDC 61+614.2:008

Scientific-Technical Progress In Medical Practice
18400192a Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian
No 8, Aug 88 (manuscript received 19 Jan 88) pp 18-24

[Article by M. B. Shtark, Inter-Academy Medical Cybernetics Department, Institute of Clinical and Experimental Medicine, Siberian Branch, USSR Academy of Medical Sciences and Academy of Sciences, Novosibirsk]

[Abstract] The scientific and technical transformation of medical practice requires the implementation of a unified scientific and technical policy, featuring independent regional programs, direct transfer of the latest achievements in fundamental science and technology, replacement of obsolete organizational forms hindering progress, direct interaction among specialists and project leaders, training of medical technical personnel, and mastery of new systems in scientific clinical practice. Medicine still finds itself unable to detect most diseases in their reversible early stages. The transition between the reversible stage and later, more serious stages of disease occurs in life during apparent good health. Detection of diseases still in their early stages is a scientific rather than organization problem. Several examples are presented of scientific developments which can assist in this process, including the "Medlab-1" computer system, a scanning densitometer for digital image processing, a digital x-ray system and a photon-correlation spectrometer, all based on the Elektronika-60 computer. Application of such new equipment in medicine lags in part due to the practice of developing the hardware by "reverse engineering" of foreign models, rather than development of new equipment in the Soviet Union. Other reasons include the lack of coordination between the research institutes of the USSR Ministry of Health and the USSR Academy of Medical Sciences, on the one hand, and institutions of the USSR Academy of Sciences, on the other; the lack of experience in competitive projects; and the lack of design bureaus in the Academy of Medical Sciences. A medical-technology department should be set up in the USSR Academy of Medical Sciences to encourage the development of new medical equipment. References 5: Russian.

UDC 61:002.6/681.31

Multidimensional Data Analysis In Medical Expert System Design
18400192b Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian
No 8 Aug 88 (manuscript received 17 Dec 87) pp 24-30

[Article by Yu. D. Volynskiy, A. I. Kurochkina, M. I. Titova, I.A. Katysheva, N. G. Astasheva and A. R. Baevskiy, Institute of Surgeryimeni A. V. Vishnevskiy, USSR Academy of Medical Sciences; Institute of Information Science, USSR Academy of Sciences, Moscow]

[Abstract] Expert systems running on personal computers can serve as a major channel for introducing the flood of new knowledge, doubling each 5-7 years, to clinical practice. Experience has shown that development of data bases and knowledge bases lags behind development of hardware and software in this area. A multidimensional medical data analysis system is suggested to cope with the probabilistic nature of symptoms and the intuitive nature of diagnosis by physicians. The system can be used directly in clinical practice, in the design of expert systems, and in medical education. Such a system was used to construct a consultative system to evaluate hemostatic disorders in surgical patients. The software was run on a YeS-103 computer. The system has been in operation in the clinic since 1985, with more than 10,000 coagulograms now stored on a YeS-1033 computer. A similar set of programs has been developed for 8-bit MX PCs and for Soviet 8-bit KORVET MSX-compatible PCs. Other variations of the system have been run on DVK-2M and Olivetti computers. The multidimensional data analysis was used to construct a knowledge base summarizing both knowledge obtained by traditional medical methods and new knowledge generated during the process of creating the expert system, to meet the needs of computer technology and to allow easy adaptation to the conditions at various medical institutions. References 5: Russian.

UDC 616-07:681.31

Application of Computers in Clinical Medicine
18400192c Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian
No 8 Aug 88 (manuscript received 29 Dec 87) pp 43-47

[Article by N. N. Kipshidze, K. L. Giorgadze, G. S. Gedevanishvili, I. Ye. Pekar, L. A. Surmava, M. A. Kvitalashvili, P. M. Kantariya, E. V. Chugunkina and N. B. Pirmisashvili, Scientific Research Institute of Experimental and Clinical Therapy, Georgian Ministry of Health, Tbilisi]

[Abstract] The authors have developed a number of systems to support automated data analysis in medical research. Two approaches were used: Direct analogy with the logic of the physician, and mathematical simulation of the processes studied and states to be analyzed. The systems include one for automatic evaluation of the status of the kidneys based on radionuclide renography, a system for automatic evaluation of the functional status of the hepatobiliary system based on γ -patho-holecystography, a system for automated radio pulmonographic data processing and an automated system for rapid evaluation of the basic respiratory function. These automated systems not only improve the objectivity of radionuclide, endoscopic and other medical studies, but also control the quality of the diagnostic process. References 23: 18 Russian, 4 Western.

UDC 61:579.254

Organization of Medical Knowledge and Decision Support By Modern Algorithmic Methods
18400192d Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian No 8 Aug 88 (manuscript received 13 Jan 88) pp 47-53

[Article by V. A. Lishchuk and N. S. Potemkina, Institute of Cardiovascular Surgery imeni A. N. Bakulev, USSR Academy of Medical Sciences, Moscow]

[Abstract] Knowledge organization and decision support have been studied at the Institute of Cardiovascular Surgery since 1973, resulting in the creation of an automated scientific research system featuring automation of experimental studies involving case history formulation and cardiac mapping. The chief component part of the system created at the institute is an automated physician's decision-support system, which was put into operation in 1974. The designers plan to base the decision-support system on mathematical simulation, including models based on the greatest possible number of experimental facts and models developed specifically for the task at hand. A flexible dialog system allows both types of models to be used. The approach now being developed differs from traditional decision-support systems in the use of multiple-aspect knowledge and facilities for its representation in the knowledge base, including mathematical simulation, and the orientation of the system toward real-time control functions.

References 19: 13 Russian, 6 Western.

UDC 616.1/.4:331.108.45

Use of Automated Teaching System In Postgraduate Training of Therapists
18400192e Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian No 8 Aug 88 (manuscript received 18 Apr 88) pp 79-83

[Article by G. M. Yakovlev, V. A. Yakovlev, Yu. N. Shishmarev, B. B. Udal'tsov, V. N. Ardashev and V. P. Levshov, Military-Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] The postgraduate department of therapy of the Military-Medical Academy has developed an automated teaching system operating in real time using version 4.1 of the RSXIM operating system and an SM-4 computer. The student's acquisition of new knowledge constantly interacts with the monitoring the results of this activity in the system, the results of testing influencing the content of information presented to the student and motivation-testing techniques used. The report presented to a student after computer testing includes a list of questions answered incompletely or improperly, plus suggested reading materials to supplement knowledge. Testing of the automated teaching

system indicated improvements in the success rates of students in comparison to ordinary teaching methods.

References 5: 4 Russian, 1 Western.

UDC 616-036.882-08.681.31

Computer Technology for Organizing Medical Care in a Resuscitation Unit

18400192f Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian No 8 Aug 88 (manuscript received 14 Apr 87) pp 83-92

[Article by V. A. Negovskiy and Yu. M. Dovzhenko, Institute of General Resuscitation, USSR Academy of Medical Sciences, Moscow]

[Abstract] A resuscitation department information system was developed by the Institute of General Resuscitation and has been functioning successfully since 1983 in three departments of the Moscow City Clinical Hospital imeni S. V. Botkin: the departments of general resuscitation and neuroresuscitation and the barocenter. The computer assists physicians in making diagnoses and generating instructions for treatment, analyzing results of tests and following changes in condition in response to treatment. No statistical data are presented on decreased lethality or reduced treatment time, but the qualitatively superior level of organization of the therapeutic process is noted by participants. Physicians retain their professional and moral responsibility for the life of their patients, even with the assistance of the computer. Figures 3, references 18: 16 Russian, 2 Western.

UDC 615.38.002.3].07:[616.153.962.4-097:578.891]-078.333

Frequency of Identification of HB-virus Markers in a Screening Study of Donor Blood Sera With Domestic Passive Hemagglutination Reaction and Enzyme Immunoassay Test Systems

18400229b Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 33 No 10, Oct 88 pp 53-56

[Article by A. V. Somova, T. A. Tupoleva, and Doctor of Medical Sciences T. V. Golosova, All-Union Hematological Scientific Center, USSR Ministry of Health, Moscow]

[Abstract] Domestically developed passive hemagglutination reaction (PHAR) and enzyme immunoassay (EIA) test systems that are now being introduced in the country's blood service were used by the researchers to study the frequency of identification of viral hepatitis B markers among the donor population. More than 2,300 donor blood serum samples were tested with the two systems for serological HB-virus markers that were seronegative with immunoelectrophoresis. HBsAg identification was highest among active blood donors. Test sensitivity and specificity for HBsAg were compared among four systems: a PHAR system developed by the

Scientific Research Institute of Epidemiology and Microbiology imeni Louis Pasteur (NIEM), an EIA developed by the same institute, an EIA developed by the scientific production association Antigen, and an imported PHAR system. Producing fewer false positives, the systems developed at NIEM were judged to be the most useful for mass donor screening. The EIA produced by the institute offered the advantages of taking less time to perform and of having a confirming test and simple packaging. Two references: 1 Russian, 1 Western.

UDC 615.384:547.221].015.4:612.017.1

Immunomodulating Properties of Perfluorcarbon Emulsions

18400229a Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian
Vol 33 No 10, Oct 88 pp 33-37

[Article by O. S. Smelova, Doctor of Medical Sciences S. I. Donskov, Doctor of Medical Sciences N. I. Afonin, E. G. Klinova, T. K. Krasavtseva, D. P. Sidlyarov, All-Union Hematological Scientific Center, USSR Ministry of Health, Moscow]

[Abstract] The researchers studied the effect on antigen-antibody binding of perfluorcarbon. Thirteen series of emulsions were used—perfluordecalin and perfluor-tripropylamine mixed in a 7:3 ratio and stabilized by proxanol P-268 or egg yolk phospholipids. The studies included several series of separate experiments in vitro: adsorption of antiglobulin, of incomplete antibodies, and of isoagglutinins and inhibition of lymphocytotoxic reaction, of complement-fixation reaction, and of rosette formation. Emulsion capacity to adsorb precipitating antibodies did not depend on perfluorcarbon concentration, particle size, proxanol concentration, or phospholipid concentration. Rh-antibodies were found to be more difficult to adsorb than were precipitating antibodies. The contact of erythrocytes and isoagglutinating sera in the emulsions did not affect the isoagglutination reaction. The addition of emulsion to freshly stored donor blood sera inhibited complement activity, and the preliminary treatment of anti-HLA sera and complement with the emulsions completely inhibited the lymphocytotoxic reaction. The cytotoxic index of sera was lowered when lymphocytes were treated with emulsion. T- and B-lymphocyte levels diminished in the rosette-formation reaction. The researchers feel that the emulsions may find application in the creation of immunomodulating filters or systems for extracorporeal

immunosorption of blood, owing to the large amount of surface the perfluorcarbon particles offer for adsorption, as well as in the development of gas-bearing blood substitutes. Two figures, 8 references (Russian).

UDC 616.71-057:626.02]-07:616.71-073.75

X-ray Diagnosis of Osteopathy in Divers With Densitometry

18400231b Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian
No 10, Oct 88 pp 31-34

[Article by S. G. Khachkurov and V. L. Ustavshchikov]

[Abstract] Individuals exposed for lengthy periods to elevated pressures are often found to experience a number of pathological changes in their osteoarticular system. Opinions vary on the link between the length of exposure and the damage, as well as on the amount of x-ray analysis needed to diagnose a problem. The researchers studied joints of the knee, hip, and shoulder in 76 divers who were aged 20-49 and who had between 30 hours underwater and 9,000 hours underwater. The control group consisted of 108 individuals with no time underwater. Visual analysis of x-rays detected pathological changes localized in the proximal heads of the humerus and the knee in 14 of the 76. No pathology was found in the hip joints. Three kinds of changes were noted: the presence of structure-less areas, clearly defined areas of cystoid restructuring, and localized osteosclerosis. The researchers suggested that the dynamics of the development of the pathological changes in the bone tissue reside in three phases: osteolysis as result of aseptic necrosis, formation of an area of cystoid restructuring when the pathological focus is separated from the intact bone areas, and organization of a pathological focus resulting from osteosclerosis within the area of cystoid restructuring. The configuration of the densitometric curves considerably when visually determined pathological changes were found on the x-rays. Densitometry in 10 of the 62 individuals in whom the x-rays showed no pathological changes revealed consistent differences between the x-ray image intensity and structure of the divers and that of the control group. The combined x-ray/densitometry study revealed pathological changes in 24 individuals, all of whom had spent more than 3,000 hours working underwater and only 9 of whom had clinical signs of caisson disease in their histories. The researchers concluded that comparative evaluation of the x-ray/densitometry data makes it possible to identify divers who are at greater risk of osteopathy. Two figures, 20 references: 9 Russian, 11 Western.

UDC 57.017.7

Utilization of 3-Chlorobenzoic Acid by Mixed Culture of Microorganisms

18400171 Moscow MIKROBIOLOGIYA in Russian
Vol 57 No 4, Jul-Aug 88 (manuscript received 9 Apr 87)
pp 550-553

[Article by G. M. Zaytsev, Institute of Microbiology,
BSSR Academy of Sciences, Minsk]

[Abstract] Considerable data have been accumulated in recent years on degradation of synthetic halogen-containing compounds, using natural populations of microorganisms. However, composition of such populations, the roles of each organism in degradation of these xenobiotics, have not been adequately studied. The metabolism of 3-chlorobenzoic acid (3CBA) was studied, using a mixed culture of microorganisms consisting of *Acinetobacter calcoaceticus* INMI-KZ-3 and *Alcoligenes faecalis* INMI-KZ-5. It was shown that this mixture liberated chlorine quantitatively from 3CBA. *A. faecalis* grew on 2-chloro-cis,cis-muconic acid, accumulating in the mixed culture as the result of 3CBA metabolism by *A. calcoaceticus*. Both the synthetic association of microorganisms and the growth culture from which these microorganisms were isolated, grew satisfactorily for 1 year without addition of growth factors to the mineral medium containing 3CBA. Figures 2; references 6: 2 Russian, 4 Western.

UDC 57.08

Discrete Laser Method for Measuring *Bacillus Thuringiensis* Concentrations

18400252e Moscow BIOTEKHNOLOGIYA in Russian
Vol 4 No 5, Sep-Oct 88 (manuscript received 15 Feb 88)
pp 665-667

[Article by M. V. Matveyev and D. S. Shapovalov,
All-Union Scientific Research and Engineering Institute
of Applied Biochemistry, Moscow]

[Abstract] A laser method was devised for the discrete enumeration of *Bacillus thuringiensis* var. *dendrolimus* and var. *kurstaki* cell concentrations, based on the Doppler effect. The light beam of the helium-neon laser (632.5 nm) was passed through a cuvette containing the culture fluid, the signals registered by a photomultiplier, and recorded on an oscilloscope. The cells were represented as peaks on the screen with the duration of an impulse corresponding to the size of the particle. The results showed that direct measurements could be made without standard curves within the range of 10^2 to 10^7 cells/ml with an error rate of about 21 percent relative to the results obtained by the Pasteur-Koch method using Goryayev's chamber. At concentrations of 10^8 cells/ml the error increased to 813 percent and was attributed to isotropic light scattering. The laser method offers the convenience of determination of low concentrations of *B. thuringiensis* cells without the need for removal of metabolites, i.e., allows for direct use of the culture fluid. Figures 2.

UDC 613.693:612.766.1

Flight Crew Fatigue Problems (Concepts, Causes, Signs, Classification)

18400238b Moscow *FIZIOLOGIYA CHELOVEKA* in Russian Vol 14 No 5, Sep-Oct 88 pp 835-843

[Article by V. A. Bodrov, Moscow]

[Abstract] The researcher draws on the data of the literature and an analysis of the results of experimental research he performed with colleagues on the problem of fatigue to define the concepts of "fatigue" and "overfatigue" in a flight crew, the causes and signs of development of the conditions, and a classification of the conditions. Here, "fatigue" is taken to represent the functional condition that develops as a result of an intensive or lengthy stint of work (both in the air and on the ground) and that manifests itself as a temporary disturbance in the condition of a number of the body's functions and as lower efficiency and poorer quality of job performance. "Overfatigue" is defined as a pathological functional condition of the body that results from repeated lengthy, intensive work stints and accumulating

fatigue, is accompanied by substantial disturbance of the condition of a number of functions of the body and a reduction in efficiency and quality of performance, and is normalized only with treatment and use of medical and psychophysiological means of rehabilitation. The principal cause of fatigue and overfatigue is an intensive or long work schedule. Adverse flight conditions, mental stress, or too much physical or mental labor before a flight can accelerate the development of fatigue; factors that predispose a crew member to fatigue including not getting proper rest and relaxation, lengthy intervals between flights, illness, lack of exercise, harmful habits, poor occupational training, and adverse physicochemical or sociopsychological environmental conditions. Signs of fatigue or overfatigue may be occupational or physical. The former involves efficiency and job performance. Physical signs include a turn for the worse in one's health or an inability to sleep. A feeling of tiredness in fatigue may worsen to a feeling of apathy, constant headaches, vertigo, loss of appetite, nausea, or even to vomiting, chest pains, a quickened heartbeat, and nightmares. The researcher classifies fatigue as compensated, acute, or chronic, sometimes worsening to overfatigue. References 51: 46 Russian, 5 Western.

UDC 577.113.5

Structural-Functional Organization of Pox Vaccine Virus Genome Segment

18400172 Moscow BIOTEKHNOLOGIYA in Russian
Vol 4 No 4, Jul-Aug 88 (manuscript received
29 Sep 87) pp 442-449

[Article by N. N. Mikryukov, V. Ye. Chizhikov, G. G. Prikhodko, I. Kh. Urmanov, O. I. Serpinskiy, V. M. Blinov, A. Ye. Nikulin and S. K. Vasilenko, All Union Scientific Research Institute of Molecular Biology, Scientific Production Association "Vector," Koltsovo Settlement, Novosibirsk Oblast]

[Abstract] Recent studies have shown that live, recombinant variants of the Pox vaccine virus (PVV) facilitate expression of foreign genes included in the genome, coding for a series of antigens assuring protection against infection with influenza, hepatitis-B, rabies and herpes virus. In the present work, nucleotide sequence of the Hind III-F-DNA fragment of the PVV, strain LIVP was determined; it has an increased transcriptional activity. The physical chart of its transcription and translation was partially decoded and recombination of foreign genetic material into the fragment of Hind III-F of viral DNA was demonstrated. Nineteen possible open translation frames were identified. According to the hemagglutinin of PVV, an alternation of early and late genes was noted throughout the entire genome segment, with a single direction of mRNA transcription. An increased content of A/T pairs was shown to be characteristic of regulatory transcription elements. Late signals of transcription initiation exhibited clearly expressed TAAAT[T_A] sequences. Figures 3; references: 34 (Western).

UDC 577.21

Engineering Plasmids Coding Diphtheria Toxin Fragments

18400236a Moscow MOLEKULYARNAYA
BIOLOGIYA in Russian
Vol 22 No 5, Sep-Oct 88 pp 1293-1300

[Article by A. G. Zdanovskiy, M. V. Zdanovskaya, Ye. M. Zaytsev, V. V. Sviridov, N. V. Yakubovich, B. A. Rebentish, N. K. Yankovskiy, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] The diphtheria toxin with no B-fragment C-terminal region can be used as a catalytic component of hormonal toxins and immunotoxins. Various derivatives of the toxin gene have been cloned in *E. coli*, but since no data existed on the creation of an immunotoxin catalytic-component producer based on that microorganism—probably because the toxin derivatives, or toxoids, are unstable in *E. coli* and are affected by proteases—the researchers attempted to study the process associated with the splitting of toxoids in *E. coli* and *Er.*

carotovora. A clone was produced that contained the plasmid that coded the toxin without the 47C-terminal amino acid residues. The gene in the toxoid was oriented in such a manner that the directions of transcription initiated from the lactose and toxin promoters coincided. Using electrophoresis and immunoblotting, the researchers found in the periplasmic fraction of TG1 *E. coli* cells a set of toxoids whose molecular weight was lower than expected. A toxoid gene was then inserted in the cells of a gram-negative *Er. carotovora* microorganism. As with the *E. coli*, restricted proteolysis of the diphtheria toxoid was observed in the *Er. carotovora*. The researchers found that the restricted proteolysis occurs either in the periplasmic space of the cells or at the moment of transport through the membrane. Based on an analysis of molecular weights, the researchers suggest that the toxoid splitting takes place at three points—one of which is at the boundary between the A and B fragments, the other two being in the B-fragment sequence. They also suggest that the signal peptidase may take part in the restricted proteolysis of toxoids in the cells of *E. coli* and *Er. carotovora*. Figures 5, references 24: 3 Russian, 21 Western.

UDC 577.112.6

Engineering and Synthesis of Peptides Capable of Specifically Binding With DNA

18400236b Moscow MOLEKULYARNAYA
BIOLOGIYA in Russian
Vol 22 No 5, Sep-Oct 88 pp 1315-1334

[Article by S. L. Grokhovskiy, A. N. Surovaya, N. Yu. Sidorova, H. Votavova, J. Sponar, I. Frich, and G. V. Gurskiy, Institute of Molecular Biology, USSR Academy of Sciences, Moscow; Institute of Organic Chemistry and Biochemistry, Czechoslovak Academy of Sciences, Prague]

[Abstract] The design and synthesis of chemical compounds capable of interacting specifically with certain nucleotide sequences of DNA are of interest because, like regulatory proteins, they could affect gene activity in bacterial and eukaryotic cells, thereby serving as effective antiviral or antitumor agents. The researchers present data involving the synthesis and DNA interaction of Dns-Gly-Ala-Gln-Lys-Leu-Ala-Gly-Lys-Val-Gly-Thr-Lys-Val-Lys-Val-Gly-Thr-Lys-Thr-Val-OH (peptide I) and [(H-Ala-Lys-Leu-Ala-Thr-Lys-Ala-Gly-Val-Lys-Gln-Gln-Ser-Ile-Gln-Leu-Ile-Thr-Ala-Aca-Lys-Aca)-_n-Lys-Aca]_n-Lys-Val-OH (peptide II), where Aca = NH(CH₂)₃CO and Dns is a residue of 5-dimethylamino-naphthalene-1-sulfonyl. Peptide I was found to bind most strongly with the poly(dG) x poly (dC) polymer, probably in the narrow DNA groove. It binds with DNA specifically in the conformation close to the β -structure. Fluorometric titration and analysis of nuclease splitting profiles of free DNA and DNA/peptide I complexes indicate that the peptide binding constant is a function of the nucleotide sequence at the binding site. Peptide I in the β -associated form binds primarily with O_RI and

O_R 2 operators. Although peptide I and the λ phage C1 repressor recognize the same or similar nucleotide sequences, the amino acid sequence of peptide I bears little resemblance to the 18-36 site in the polypeptide repressor chain and is unlike the sequence in the recognizing α_3 -helix of the repressor. Peptide I binds specifically with DNA, recognizing the nucleotide sequences close to those on which the C1 repressor of the λ phage binds selectively. The amino acid sequence of peptide I, however, differs from the sequence corresponding to the DNA-binding domain of that repressor. Peptide I contains a large number of residues of valine and threonine, which are encountered in the β -structure sites more often than in the α -helices. Moreover, the valine and threonine residues, according to the recognition code proposed for describing specific contacts between β -structure domain regulatory proteins and DNA, are GC- and AT-coding residues, respectively. In peptide I, the valine and threonine residues are arranged such that, in the complex between the β -associated dimer and the O_R 1 operator of the λ phage, they are located at sites that match GC and AT operator pairs. Peptide II contains four identical amino acid sequences that match the double-helix configuration of the phage 434 Cro repressor. The sequences, with a helix-turn-helix configuration, are joined covalently in such a way that two pairs can interact with two halves of the symmetrical operator that consists of 14 base pairs. It is reasonable to assume that the α - β transition is observed in the double-helix configuration and leads to the formation of an unparallel β -layer between the sites that correspond to the α_2 and α_3 helices. When peptide II binds with DNA, substantial conformational changes occur in the double-helix configuration. Figures 11; references 57: 9 Russian, 48 Western.

UDC 539.143.43:632.937.15 BT

NMR Relaxation Data on *Bacillus Thuringiensis* Protein Crystallotoxin Structure

18400252a Moscow BIOTEKHNOLOGIYA in Russian
Vol 4 No 5, Sep-Oct 88 (manuscript received
8 Jul 86) pp 590-595

[Article by V. Ya. Volkov and B. V. Sakharov, All-Union Scientific Research Institute of Applied Microbiology, Obolensk, Moscow Oblast]

[Abstract] NMR studies were conducted on the structural characteristics of the *Bacillus thuringiensis* crystallotoxin, with the data compared for the proteins derived from two bacterial strains (vars. *kurstaki* and *galleriae*). The temporal dependence of the T_1 and T_2 relaxation times in relation to the water content, and the relationship between the rate of spin-spin relaxation of water

protons and the concentration of the protein crystals in the suspension, pointed to a highly porous entity. The porosity was calculated as equivalent to 0.56, with approximately 40 percent of the porous space represented by channels less than 1 nm in diameter, and 60 percent consisting of cavities with diameters of 10 nm and greater. The maximum functions of the bimodal distribution of the pores in terms of size are, respectively, 0.5 and 10 nm. The higher T_1/T_2 values for the *B. thuringiensis* var. *galleriae* protein than for the var. *kurstaki* protein (15 vs. 3) are evidently due to a higher concentration of bound water due to a greater surface area in the former crystals. Furthermore, the high energy of activation for the T_2 process (7.4 kcal/mole) indicates considerable restriction on water mobility in the pores. These findings may be related to the toxic mechanisms of action of the *B. thuringiensis* crystalloprotein on insects. Figures 4; references 11: 2 Russian, 9 Western.

UDC 577.113.6:577.218

Chemical and Enzymatic Synthesis and Cloning of α -Amylase Signal Peptide Gene of *Bacillus Amyloliquefaciens* for Expression of Synthetic Human Leukocytic Interferon Gene

18400252b Moscow BIOTEKHNOLOGIYA in Russian
Vol 4 No 5, Sep-Oct 88 (manuscript received
19 Jan 87) pp 609-617

[Article by V. N. Krasnykh, N. K. Danilyuk, A. A. Ilyichev, Yu. A. Gorbunov, A. I. Lomakin, A. N. Sinyakov, I. A. Vtorushina, S. I. Yastrebov, S. G. Popov, I. V. Timofeyev and S. N. Shchelkunov, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] α -Amylase is one of the most efficiently expressed proteins in *Bacillus amyloliquefaciens*, with similar levels of expression reportedly attained in *B. subtilis* cells bearing a genetically engineered α -amylase structural gene and its regulatory elements. Consequently, a system was constructed for the expression of a synthetic gene for human leukocytic interferon that relied on the regulatory sequences of the α -amylase gene. A series of established chemical and enzymatic steps were used for the synthesis of an oligonucleotide sequence bearing the regulatory elements of the α -amylase gene—promoter and ribosomal binding site—and a synthetic gene for human leukocytic interferon. The resultant sequence, about 700 bp long, was then used for the construction of recombinant plasmid vectors. The success of the approach was demonstrated by *B. subtilis* cells engineered with plasmid pBMB101 and *E. coli* cells bearing plasmids pEMB303 and pEMB304 that, on lysis, were shown to exhibit interferon-type antiviral activities. Figures 5; references 21: 13 Russian, 8 Western.

UDC 591.51:614.875

Behavioral Effect on Rats of Single Exposure to Microwave Energy

18400173 Moscow ZHURNAL VYSSHEY NERVOY DEYATELNOSTI IMENI I. I. PAVLOVA in Russian Vol 38 No 4, Jul-Aug 88 (manuscript received 8 Jun 87) pp 764-766

[Article by M. A. Navakatikyan and T. I. Moroz, Scientific Research Institute of General and Communal Hygiene imeni A. N. Marzeyev, UkrSSR Ministry of Health, Kiev]

[Abstract] An attempt was made to analyze behavioral effects resulting from single exposure to microwaves in the

energy flux densities (EFD) ranging from moderately thermogenic to "non-thermal," and to explain the role of thermoregulating reactions in their genesis. Experiments were performed on white rats exposed to individual irradiation with continuous microwaves with EFD of 0.1, 1 and 10 mW/cm². Activity of the experimental animals, using 10 elements of behavior, was observed immediately after irradiation. No change in the behavior patterns were observed at 0.1 and 1 mW/cm² energy level. Even at the 10 mW/cm² level no immediate changes were noted. Only after a 2-week exposure to the dose of 3.6 W/kg, 10 hrs per day, some behavioral changes were observed presumed to be the results of thermoregulatory effect. Overall, the experiment gave negative results. Figures 2; references 5: 3 Russian, 2 Western.

UDC 577.15.0.253

In Vivo and in Vitro Reaction of Eserine and Baygon With Mouse Brain Acetylcholinesterase
*18400174 Yerevan NEYROKHIMIYA in Russian
Vol 7 No 2, Apr-Jun 88 (manuscript received
17 Mar 88) pp 211-216*

[Article by Ye. K. Balashova, L. I. Kugusheva, V. I. Rozengart and O. Ye. Sherstobitov, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] Decarbamylation of cholinesterases has been reported in literature but no data could be found accompanying *in vivo* and *in vitro* results nor any reports on the activity of acetylcholinesterase (ACE) in brain as a function of the content of carbamates in brain. This aspect was studied on white mice using eserine (physostigmine) and baygon (propoxur) carbamates. It was shown that intraperitoneal injection of these agents led to a 70-80 percent inhibition of ACE activity. Recovery of enzyme activity was faster in case of baygon (50 percent recovery $t/2$ in 23 min) than with eserine ($t/2$: 60 min). The relative level of eserine in brain of the experimental animals was much higher than the level of baygon (about 10 times higher). The recovery of ACE activity in the *in vitro* experiments was identical in both cases, $t/2 = 14$ min. An assumption was expressed that this higher level of eserine and its slow removal from the brain may be the cause of slow recovery of the ACE activity when this carbamate is used. Figures 3; references 7: 2 Russian, 5 Western.

UDC 615.214.21:547.27].07

Pharmacologic Activities of Crown Ethers
*18400184a Moscow
Khimiko-Farmatsevticheskiy Zhurnal in Russian Vol 22 No 8, Aug 88 (manuscript received 30 Apr 87) pp 962-965*

[Article by G. I. Vankin, N. V. Lukyanov, T. G. Galenko and O. A. Rayevskiy, Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

[Abstract] A series of crown ethers were tested on outbred mice for neuro- and psychotropic activities, to further expand the armamentarium of this class of compounds in experimental pharmacology. The compounds under study were the following benzo derivatives: 12-crown-4 (I), 15-crown-5 (II), 18-crown-6 (III), benzo-12-crown-4 (IV), benzo-15-crown-5 (V), benzo-18-crown-6 (VI), dibenzo-12-crown-4 (VII), dibenzo-18-crown-6 (VIII), and dibenzo-24-crown-8 (IX). The resultant data showed that the LD₅₀ values for these compounds on subcutaneous administration ranged from 82 to over 1000 mg/kg. Compounds IV, VIII and IX demonstrated anticonvulsive properties, while all possessed low to moderate myorelaxant activities. In

addition, compounds II, III, VIII, and IX attenuated motor activity, while IV, and V enhanced it. Compound IV had variable motor effects: in low doses (1 mg/kg) motor activity was stimulated by 36 percent, while in high doses (5 mg/kg) activity was depressed by 60 percent. Finally, the survival rates under hypoxic conditions were prolonged by 27 to 206 percent by compounds IV, V, VI, VII, VIII, and IX. (i.e., the benzo derivatives). References 11: 7 Russian, 4 Western.

UDC 615.217.32:547.279.2].07

Comparative Assessment of Cholinergic Activities of Alkylated Sulfonium and Ammonium Ions
*18400184b Moscow
Khimiko-Farmatsevticheskiy Zhurnal in Russian Vol 22 No 8, Aug 88 (manuscript received 21 May 87) pp 966-969*

[Article by A. A. Abduvakhabov, G. G. Verba, E. A. Mirzabeyev, M. T. Iminov, N. N. Kovalev, V. V. Lavrentyeva and Ye. V. Rozengart, Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent; Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] A study was conducted to assess the importance of the onium atom in cholinergic mechanisms, relying on a comparative analysis of the effects of alkylated sulfonium and ammonium ions of human RBC acetylcholine esterase (EC 3.1.1.7; AChE) and equine serum butyrylcholine esterase (EC 3.1.1.8; BCHE). In addition, the compounds were also tested on the nicotinic receptors of the frog rectus abdominis muscles. Evaluation of the enzyme kinetics demonstrated that the methyldialkyl sulfonic acids and the acetoxyethylidialkyl sulfonic acids were somewhat less efficient as enzyme inhibitors than tetraalkylammonium compounds. In studies with the nicotinic receptors the degree of disparity became even more pronounced. The differences were attributed to the structural features of the sulfonic compounds on the one hand, and the ammonium congeners on the other. References 6 (Russian).

UDC 615.224.036.8.015.44:616.127-005.8-003.9-001

Use of Experimental Morphological Criteria in Assessment of Drug Efficacy
18400186b Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 7, Jul 88 (manuscript received 13 Feb 87) pp 80-83

[Article by R. G. Vachnadze, T. A. Gibradze, M. O. Karchava and S. G. Markozashvili, Department of Clinical and Experimental Chemotherapy, Institute of Pharmacochimistry, and the Department of Computerized Planning, IVM (expansion unknown, computer institute), Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] A computer-based assessment of vasodilators was devised, based on matrix-type analysis of drug effects in dogs with experimental heart infarcts. The

analysis, both for purposes of comparison and evaluation of individual drugs, is based on evaluation of 18 morphological parameters over a period of 12 weeks. For experimental purposes the following morphological characteristics were found to be most significant in drug testing: the presence of necrotic areas, status of the myofibrils, and the number of intact fibers in the zone of ischemia. Less informative was information on the status of capillaries, arteriolar diameter, and the extent of development of a capillary network. Assessment of three commonly-used cardiovascular agents showed that Trental (pentoxifylline) and Corvaton (molsidomine) were far more effective in the management of experimental myocardial infarction in the dog than Pexid (perhexiline). Figures 2; tables 2; references 3 (Russian).

UDC 615.31:547.943].03:616-008.922.1].076.9

Antihypoxic Properties of Endorphins, Enkephalins, and Their Analogs

18400191d Moscow BYULLEHEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 8, Aug 88 pp 174-178

[Article by V. V. Ysnetsov, Scientific Research Institute of Biomedical Technology, USSR Ministry of Health, Moscow]

[Abstract] In studying the effects of morphine, tyrolyberin, enkephalins, and their analogs on the resistance of mice to hypobaric hypoxic hypoxia, the author found morphine and leu-enkephalin extended the life of animals "lifted" to an "altitude" of 10,500-10,700 m in a pressure chamber. Similar activity was exhibited by DADLE and the nitro analog of tetrapeptidamine. Naloxone (in a dose of 1.0 mg/mg) completely blocked the antihypoxic effect of morphine, leu-enkephalin, and the analogs. It is thought that μ - and δ -opioid receptors participate in the antihypoxic effects. In another series of experiments, morphine, leu-enkephalin, and the nitro analog of the tetrapeptide had antihypoxic properties with mice in a sealed chamber. A third set of experiments found that only morphine consistently increased the lifespan of mice subjected to hemic hypoxia. Overall, experiment results appear to indicate that endogenous opioids participate in the defense of the body against acute hypoxic hypoxia, probably by reducing the tissue's oxygen demand. Fifteen references: 9 Russian, 6 Western.

UDC 616.822.014.46:[615.357.577.1]75.823].08

Neurons of the Spinal Ganglia of Rats—A Model for the Study of Central Serotonin Receptors

18400191c Moscow BYULLEHEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 8, Aug 88 pp 172-174

[Article by I. I. Abramets, I. V. Komissarov, and I. M. Samoilovich, Department of Pharmacology, Donetsk Medical Institute imeni M. Gorkiy]

[Abstract] Serotonin-receptor populations (3 H-spiroperidol-labelled, or S_2R , and 3 H-serotonin-labelled, or S_1R) are shown to exist in spinal ganglia neuron membranes.

and the mechanisms that underlie the stimulating and inhibitory effects of serotonin on these nerve cells are studied. Serotonin-induced depolarization and elevation of the input resistance of the neurons was diminished by methysergide and amitriptylin, which are similar to S_2R , which suggests that serotonin-induced depolarization is through S_2R . The fact that neither the depolarization responses nor the hyperpolarization responses of the neurons changed in the presence of propranolol, and that propranolol does not interact with S_2R , but has a high affinity for the S_{1B} subtype receptor, suggests that serotonin-induced hyperpolarization is mediated through the S_{1A} subtype. Serotonin was found to increase conductivity by amplifying K⁺ permeability. Since the S_2R -mediated depolarization is accompanied by an elevation in the input resistance, and its potential of reversal is close to the potassium equilibrium potential, the reaction may be considered a result of the inactivation of channels of an incoming K⁺ flux similar to the M⁺ flux. The spinal ganglia of the rat are found to be a good model for studying central serotonergic mechanisms because neuron response may be reproduced either through S_2R , via the reduction of K⁺ conductivity, or through $S_{1A}R$, via amplification of K⁺ conductivity. Two figures, 10 references: 2 Russian, 8 Western.

UDC 615.384:547.221]:615.451.23].07

Methodological Features of the Study of Gas-Transport Functions of Perfluorocarbon Emulsions

18400247a Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 9, Sep 88 pp 1039-1043

[Article by I. N. Kuznetsova, Leningrad Scientific Research Institute of Hematology and Blood Transfusion]

[Abstract] Emulsified perfluorocarbons (PFC)—chemically inert liquids that dissolve gases well—served as the basis for the creation of blood substitutes that transport gases. Although the emulsion is now in the clinical stage of study, researchers have examined, for the most part, only the amount of oxygen contained in the emulsion and its contribution to total systemic transport. The process of supplying oxygen to the body's tissues, however, is also closely linked to the process of removing carbon dioxide. Considering the special role played by CO₂ dissolved in plasma as a regulator of a number of physiological parameters, as well as its elevated solubility in PFC, the author seeks to describe accessible ways of determining fluorocarbon phase content in the blood with centrifuging and to examine the basic principles and order for determining the parameters of the transport of oxygen and CO₂ via particles of PFC circulating in the bloodstream. A means for determining a unit per volume count is explained. The author also takes a look at the features of CO₂ transport by the fluorocarbon phase of the emulsion. Figures 2; references 15: 10 Russian, 5 Western.

UDC 615.243.6.012.1

Antiemetic Activity and Structural Features of 4-Substituted 5-Nitro-2-Methoxy-N-[2-Diethylaminoethyl]benzamides

184002476 Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 9, Sep 88 pp 1108-1111

[Article by V. K. Mukhomorov, G. K. Semenova, and M. G. Shagoyan, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] Since a frequent and severe side effect of radiation treatments and chemotherapy is nausea and vomiting, the search for effective antiemetics is especially urgent among cancer patients. According to the

literature, the most promising antiemetics are compounds of a number of substituted benzamides, which do not have side effects and are tolerated well by the patient. In an attempt to establish quantitative correlations between structure and biological activity in 15 substituted benzamides, the authors injected 20 mongrel dogs with apomorphine and used the benzamides as antiemetics. Biological activity was modified in the compounds by varying the substituent in position 4 of the benzene ring. The authors present a regression equation for describing the quantitative link between structure and activity. The steric parameters described by Verloop were found to be the most informative in terms of interpreting the change in activity produced by varying the substituent. The authors conclude that varying only the dimensions of the substituent in position 4 will not produce a compound with activity much greater than that of dimetpramide. Figure 1, references 19: 13 Russian, 6 Western.

New Method of Studying Brain Function Devised
18400159 Moscow TASS in Russian
0901 GMT 16 Nov 88

[Report by TASS correspondent Ivan Ivanov]

[Text] A discovery by Prof Boris Kotlyar of the Biology Faculty of Moscow University promises a real breakthrough in research into the mechanism of brain function. He has worked out a method of observing the function of isolated individual cells of the brains of mammals—neurons, considered impossible, in principle, to separate.

"Hitherto scientists have been able to study sections of the brain or, at best, groups of neurons, consisting of several dozen cells," Prof Kotlyar told the TASS correspondent. "But in order to understand the mechanism of brain function, in particular how the processes of storing information or learning take place, one needs to thoroughly know the processes occurring in the individual neuron."

Researchers of many countries have in the past few decades made attempts to study the properties of individual neurons of the mammalian brain. But these attempts have been unsuccessful because the neuron's link with other nerve cells could not be interrupted. But unless these links are "switched off," the sum total of neurons become the object of study, instead of the individual neuron. And the properties of a group of cells are qualitatively different from that of an individual neuron.

The principal importance of Prof Kotlyar's work lies in the fact that he has managed to find a method of isolating the live neuron from other nerve cells. At the same time the neuron remains "alive," maintaining its former activity and level of excitability. "The crucial role in establishing links between neurons is played by positively charged calcium ions," said Boris Kotlyar. "Their concentration in the medium between cells is 10 times higher than inside each neuron. By lowering the concentration of calcium by chemical methods, we deprived the cells of the conditions for transmitting information. The process of this isolation of the neuron is reversible. In experiments, 1 hour after the "switching-off," when the necessary amount of calcium had been restored to the inter-neuron medium, the neurons rejoined the work of the nerve tissue."

Boris Kotlyar said he would devote his further research in the field of neurobiology to the study of the mechanism of neuron function, including its abilities to learn by association and to remember information and other properties.

UDC 612.111-06:612.273.2

Change in the Ultrastructure of Cellular Elements of the Blood in Rats in Hypoxia in an Altitude Chamber

18400175a Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian
Vol 131 No 1, Jul 88 pp 129-132

[Article by K. N. Sisauri, Institute of Experimental Morphology imeni A. N. Natishvili, GSSR Academy of Sciences]

[Text] In studying the nature of changes in the ultrastructure and intracellular metabolism of erythrocytes and leukocytes subjected to prolonged oxygen deficiency, the researchers placed 65 male mongrel rats in an altitude chamber that simulated conditions at 5,000-7,000 meters above sea level. The temperature was maintained at 19-21°C. The rats were kept in the chamber for two hours a day, five days a week, and were decapitated after either one, 10, or 30 days of exposure to hypoxia. In the rats sacrificed after one day of exposure, the neutrophil polymorphous-nucleus leukocytes and lymphocytes were the same as those in the control animals sacrificed after one day. The leukocytes had an irregular cell membrane, and 2-3 nuclear segments with pronounced chromatin condensation were apparent in the relatively dense cytoplasm, with a large number of fine, densely packed specific granules. The fine graininess with azure affinity was concentrated in the near-nucleus region. Near the cytoplasmic membrane, small vesicles were noted with lightly colored contents. The peripheral blood lymphocytes varied in terms of nucleocytoplasmic ratio, size, nucleus density, and number of organelles in the cytoplasm. In the rats sacrificed after 10 days, specific granules were degranulated, the processes of catabolism were amplified in the small lymphocytes (as evidenced by the accumulation of lysosomes and lipid structures), and the large lymphocytes underwent dystrophic changes. After 30 days, the ultrastructure of the lymphocytes normalized, most likely an indication of the compensation-adaptation response of the body. Two figures, 6 references: 4 Russian, 2 Western.

UDC 591.147:612.28

Tyroliberin and Its Analog Without Hormonal Properties Stimulate the Activity of the Respiratory Center in the Frog Rana Temporaria
18400175b Leningrad ZHURNAL EVOLVUTSIONNOY BIOKhimii I FIZIOLOGII in Russian Vol 24 No 4, Jul-Aug 88 pp 545-550

[Article by I. Ye. Gurskaya, Ts. V. Serbenyuk, P. Ya. Romanovskiy, Chair of Human and Animal Physiology, Biology Department, Moscow University]

[Text] The peptide tyroliberin has been shown to have a stimulating effect on respiration both in the norm and in acute hypoxia. Its presence in the brain of warm-blooded animals not only in the hypothalamus, but also in the brainstem—especially in the region of the dorsal respiratory group of nuclei and in the nucleus of the solitary tract—may indicate a substantial role in the regulation of the activity of the respiratory of warm-blooded animals. In amphibians, tyroliberin has also been found in extrahypothalamic areas of the brain, outside the CNS, and, some cases, in the skin and blood. The researchers studied the effect of tyroliberin and an analog synthesized at the Latvian Academy of Sciences Institute of

Organic Synthesis, PR-546 (which has no hormonal properties), on the respiratory center of *Rana temporaria*. Both compounds were found to have a stimulating effect on the frequency of appearance of motor respiratory discharges, regardless of the method of administration (into the lymphatic sac or via direct application on the region of the medulla oblongata), which suggests that they may pass through the blood-brain barrier. The results indicate that the compounds activate structures concentrated in the medulla oblongata; at the same time, it is possible that the compounds work through either the medullar or the vascular chemoreceptor areas. Both compounds proved to be capable of restoring normal rhythmic operation of the respiratory center in an amphibian. One figure, 13 references: 3 Russian, 10 Western.

UDC 557.12:155.3

Relationship of the Effect of Arginylvasopressin on the Development of the Conditioned Response of Active Avoidance to Reinforcement Frequency
18400175c Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: BIOLOGIYA in Russian No 3, Jul-Sep 88 pp 24-27

[Article by A. B. Nikonova and S. A. Titov]

[Text] Vasopressin has been observed to have a positive effect on various kinds of learning and memory both in experimental animals and in preliminary clinical tests, including the pharmacologically induced disturbance of the development of the conditioned response of active avoidance. In order to identify the conditions in which the administration of vasopressin can eliminate the disturbance of behavioral responses, the researchers hindered the development of active avoidance in male albino rats by using partial reinforcement. After each training session, the animals were injected with arginyl-vasopressin. When the researchers reduced the frequency of reinforcement, the facilitating effect of the hormone was weak and delayed. The difference between this effect and that noted in pharmacologically induced disturbances may be due to the fact that the action of the hormone was directed at a reaction that was in response to afferent stimuli and paid selective attention to biologically significant signals. Two figures, 7 references: 4 Russian, 3 Western.

UDC 612.273.2.014.49-08:[612.822.1+612.015.3

Biochemical Correlates of Hypoxic Adaptation and Their Application to Hypobaric Therapy
18400182a Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 4, Jul-Aug 88 (manuscript received 28 Mar 86) pp 48-51

[Article by G. M. Pokalev, Ye. M. Khvatova, G. B. Fomina, N. P. Nedugova, Ye. N. Shumatova, T. I. Shlapakova and S. N. Savelyeva, Chair of Internal Diseases, Military Medical Faculty, and Chair of Biochemistry, Gorky Medical Institute imeni S. M. Kirov]

[Abstract] The demonstration that gradual adaptation to hypoxic conditions leads to a different level of metabolic function led to studies of biochemical correlates of

hypoxic adaptation in chinchilla rabbits and outbred male rats. Exposure of the animals to an altitude equivalent of 7000 m (310 mmHg) for 1 h/day for 2-8 days precipitated in changes in brain energy metabolism indicative of adaptation. Beginning with the 4th day, oxidative phosphorylation was enhanced by 25 percent and was accompanied by alterations in metabolite concentrations pointing to more efficient energy metabolism. The changes seen after 8 days of adaptation were essentially identical with those observed after 4 days. Animals that were 'trained' in this manner showed good tolerance of a subsequent challenge of an altitude of 10,000 m for 30 min, with only one of 13 experimental animals succumbing. The death rate for control ('untrained') animals reached 1/3rd of the total. The latter animals did not respond with a rapid metabolic shift toward more efficient oxidative phosphorylation as did the experimental animals. Biochemical monitoring and therapeutic trials conducted with a cohort of 17-to-40-year-old patients with neurocirculatory dystonia showed better tolerance of the hypoxic test (40 min inhalation of 10 percent O₂ air-nitrogen mixture) following a 10-12 day hypoxic training period (breathing the 10 percent O₂ gas mixture for 1 h/day). The improvement was evident on both subjective and objective clinical grounds, indicating that metabolic studies may be used in monitoring the efficacy of hypobaric therapy. Figures 1; references 5: 3 Russian, 2 Western.

UDC 612.13+612.53+577.15/17

Coupling of Thermoregulatory and Hemodynamic Effects of Central Administration of Bombesin
18400179b Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 74 No 8, Aug 88 (manuscript received 10 Dec 87) pp 1186-1190

[Article by A. T. Maryanovich, Yu. I. Shipilov and V. N. Tsyan, Chairs of Normal and Pathologic Physiology, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] Male chinchilla rabbits were used in a study designed to test the effects of the C-terminal nonapeptide fragment of bombesin on hemodynamics and thermoregulation when administered into a lateral ventricle. The resultant data showed that administration of 100 micron g of the peptide led to a 21.5 mmHg increase in the arterial BP within 10 min, and a 89.5 beats/min decrease in the heart rate within the same timeframe. Both changes persisted for the 60 min period of observation. In addition, the changes in the hemodynamic parameters were accompanied by a 1.48°C drop in the rectal temperature. The reduction in body temperature was attributed to a combination of the hypertensive effect and peripheral vasodilatation which resulted in greater peripheral blood flow and, hence, greater loss of body heat. In conjunction with reported data on the effects of bombesin on peripheral blood flow at room temperatures and low temperatures, as well as on the

gastrointestinal system, the data were interpreted to indicate that bombesin exerts a dual effect on myocardial contractility. The final data were interpreted to suggest that bombesin is involved in the depression of the activity of the sympathetic neurons of the upper thoracic segment of the spinal cord, accompanied by simultaneous potentiation of the sympathetic neurons of the midthoracic segment. Figures 2; references 14: 6 Russian, 8 Western.

UDC 612.82+599.325.1

Cholinergic Mechanisms Underlying Altered Brain Activity in Motion Sickness

18400179a Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 74 No 8, Aug 88 (manuscript received 13 Jun 87) pp 1109-1119

[Article by V. F. Maksimuk and N. A. Skoromnyy, Laboratory of Comparative Physiology of Blood Circulation, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] Administration of scopolamine, a cholinolytic agent, to rabbits subjected to motion sickness was used to evaluate the involvement of cholinergic mechanisms of altered brain activity attendant to the pathologic state in question. The study was conducted with male and female rabbits subjected to rotation at 30-34 rpm for 1 h with 90° amplitudes with monitoring of cerebral blood flow, cardiovascular function, and electrocorticograms. The experimental animals were treated intravenously with 0.2 or 0.5 mb/kg scopolamine 1 min before the trial was commenced to assess the importance of cholinergic mechanisms in the pathophysiological spectrum. Priming with scopolamine was shown to mitigate the enhancement of cerebral blood flow seen in untreated control animals, but was without a telling effect on oxygen tension in the cortical formations and did not affect motion-induced bradycardia. However, scopolamine did enhance activational processes and brain bioelectrical activity, particularly in the motor region of the cortex. Despite some pathologic manifestations on the electrocorticograms, scopolamine was felt to have a stabilizing effect. The protective effects of this agent were assumed to be due to central cholinolytic effects, but the failure to correct all cerebral abnormalities points also to the involvement of other neurotransmitter systems in the pathophysiology of motion sickness in the rabbit. Figures 6; references 21: 1 Ukrainian, 13 Russian, 7 Western.

UDC 612.825:612.014.42

Electrophysiological Studies on Afferent Connections to Embryonic Neocortical Allografts in Projection Sites of Adult Rats

18400180a Kiev NEYROFIZIOLOGIYA in Russian Vol 20 No 4, Jul-Aug 88 (manuscript received 20 May 87) pp 448-456

[Article by S. V. Girman and I. L. Golovina, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] Electrophysiological studies were conducted on embryonic allografts in adult female rats 3 to 3.5 months after transplantation of the 2-3 mm² neocortical grafts from 17-18 day embryos. The grafts were placed into the occipital cortex or other somatosensory areas, with the results demonstrating that in almost half of the recipients the transplants yielded evoked responses to appropriate stimuli. The response of the transplanted tissues demonstrated neuronal patency indicative of afferent projections. Stimulation of a number of selected brain structures resulted in the further demonstration that the transplants received afferent inputs from the thalamic nucleus as well as from contralateral homotopic regions of the cortex. The latent periods and other temporal characteristics of the bioelectrical activity of the target areas were essentially identical to those characterizing normal cortical tissues. In summary, the findings pointed to neural regeneration and restoration of afferent input to the cortical implants analogous to the situation in control animals. The nature of the neurophysiological mechanisms underlying the functional status of the transplants remains unclear, although both regeneration and synaptic reorganization in the thalamic nucleus appear to be involved. Figures 6; references 12: 2 Russian, 10 Western.

UDC 612.89:616-003.725

Effects of Baliz-2 on Growth of Sympathetic Ganglia of Rats in Relation To Breed

18400180b Kiev NEYROFIZIOLOGIYA in Russian Vol 20 No 4, Jul-Aug 88 (manuscript received 17 Jul 87) pp 539-546

[Article by M. V. Kozlova, A. Ya. Shurygin, I. P. Sidorenko and V. U. Kalenchuk, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow; Scientific Research Institute of Physical and Organic Chemistry, Rostov State University, Krasnodar]

[Abstract] Trials were conducted with Baliz-2, microbial product consisting of a mixture of keto acids, designed to test this preparation for possible neurotropic action. Testing was conducted with tissue cultures of cervical sympathetic ganglia derived from neonatal Wistar, Wag, and August rats, with the results assessed in terms of the effects of Baliz-2 on growth parameters. After four days of culture under identical conditions the growth rates of the explants from the Wistar and Wag rats were approximately twice as great as of the August explants when measured as bundle formation and neurite extension. Cultivation in the presence of 0.001 or 0.0001 percent Baliz-2 increased the growth rate of the August explants 2.3- to 2.6-fold over control August values, and of the Wistar and Wag rats some 1.8- to 2.0-fold over their respective control values. This work is the first to report that Baliz-2 functions as a nerve growth factor. Furthermore, the greater responsiveness of the August explants correlated with the fact that the plasma catecholamine levels in the August rats are twice those reported for Wistar and Wag rats. The fact that the August rats

respond in a more emotional manner to stress may find correlation here with the greater responsiveness of the sympathetic ganglia to exogenous chemical stimulation. Figures 6; references 24: 12 Russian, 12 Western.

UDC 612.821

Neuronal Organization of the Stages Associated With Making a Decision. Report II. Case of Making a Decision Based on Two Consecutive Stimuli

18400238a Moscow *FIZIOLOGIYA CHELOVEKA* in Russian Vol 14 No 5, Sep-Oct 88 pp 723-729

[Article by Yu. D. Kropotov and V. A. Ponomarev, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] In the report that preceded this one (Kropotov, Ponomarev, *FIZIOLOGIYA CHELOVEKA*, 1985, Vol 11, No 4, p 563), individuals were administered a decision-making test in which they were presented with a pair of stimuli, the first of which was informational (defining a subsequent action to be taken) and the second of which was a trigger (allowing the action to be taken). Electrodes registered the neuronal activity associated with the performance of the test. In goal-oriented human activity, the interval between the presentation of an informational stimulus and the behavioral response of an individual is filled with psychological processes, among which are the process itself of deciding on an action and the processes associated with preparing the various brain systems for immediate execution of movements expressed in particular as a change in tonus. In actuality, such processes take place almost instantaneously. The researchers, however, attempted to separate the two processes in time with a psychological test in which the informational aspect consisted of two consecutive stimuli followed by a third, trigger stimulus. Individuals with Parkinson's disease were first administered a test with one informational stimulus and then a test with two informational stimuli. The second test consisted of 256 samples presented in series with 40 samples each. Each sample consisted of three stimuli spaced at one-second intervals. During the test, current frequencies of discharges of neuronal populations recorded by a computer with a quantization frequency of 50 Hz. The researchers found that several neurophysiological processes that were reflected in short and long latent components (a latent period of 300 msec or longer represented a long latent component), as well as in slow shifts of discharge frequency, developed in the subcortical formations of the brain during the making of a decision on a course of action. The slow shifts in frequency of discharges before the trigger stimulus took place when the second informational stimulus was presented. The shifts were associated with the preparation of the brain systems for immediate execution of a movement or a mental act. Early components associated with subsequent processes of increasing or decreasing frequency of pulsation of subcortical neurons appeared

in response to the presentation of all the stimuli that had informational value in a given sample. When a stimulus postponed a potential action or active analysis of subsequent stimuli, the components associated with a reduction in frequency of discharges had a large amplitude and duration. The neuronal response components with a long latent period that arose in response to the first informational stimulus reflected in their amplitude the specifics of the stimulus and were apparently associated with a nerve model of the stimulus or with the program of subsequent potential action. Figures 2, references 6 (Russian).

UDC 612.13.014.46:615.31:[547.95:547.943

The Effect of Opioid Peptides on Regional Hemodynamics in Conscious Rats

18400191a Moscow *BYULLENTEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY* in Russian Vol 106 No 8, Aug 88 pp 136-139

[Article by Ye. A. Martynova and O. S. Medvedev, Laboratory of Experimental Pharmacology, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] The researchers studied the reactions of systemic and regional hemodynamics induced by intravenous injection of selective agonists of μ - and δ -opiate receptors in conscious rats. [DAla², DLeu⁵]-enkephalin (DADL) was used as the δ -agonist, and [DAla², MePhe⁴, Gly⁵-ol]-enkephalin (DAGO) as the μ -agonist. These peptides have both a high affinity and a high selectivity for the same type of opiate receptor. Moreover, both peptides are highly resistant to the degrading action of peptidase, which is especially important in the study of the effects of intravenously administered peptides. The intravenous injection of the peptides in doses of 1 μ mol/kg reduced arterial pressure and induced bradycardia and apnea, all with a brief latent period. The apnea lasted an average of 5-10 minutes, and the hypotension and bradycardia reached their maximums within 30-60 seconds after the injection. Intravenous injection of nalaxone 8 minutes before the injection of the peptides blocked the development of the DADL and DAGO effects on systemic hemodynamics and respiration. The effects produced by DADL and DAGO appeared to be related to activation of opiate receptors associated with pulmonary vagal afferents. The injection of DADL consistently increased blood flow in the adrenal glands and lowered it in skeletal muscles. Vascular resistance was reduced in the adrenal glands, the kidneys, the heart, the intestine, and the spleen. DAGO increased blood flow in the adrenal glands and lowered it in the skin and in the pancreas. Vascular resistance rose in the pancreas and the skin and dropped in the adrenal glands. The drop caused in vascular resistance by both peptides in the adrenal glands and by DADL in the kidneys, heart, and

intestine may have been due to a suppression of background sympathetic activity. The regional hemodynamics reactions may reflect the direct interaction between the peptide agonists and the peripheral presynaptic opiate receptors of the blood vessels. The most substantial changes in regional blood flow were in the adrenal glands, which may have been associated with changes in their secretory activity. Three figures, 15 references: 3 Russian, 12 Western.

UDC 616.831-008.922.1-02:613.863-036.12]-07

Characteristics of Free Radical Oxidation and Antiradical Defense of the Brain in Adaptation to Chronic Stress

18400191b Moscow BYULLETELN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 8, Aug 88 pp 153-156

[Article by N. V. Gulyayeva and I. P. Levshina, Laboratory of Experimental Pathology and Therapy of Higher Nervous Activity, Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] The key role of the activation of free-radical lipid oxidation in the damaging effects of stress has been convincingly demonstrated in recent years. A little-studied aspect of the problem, however, is the mechanism of adaptation to free-radical lipid oxidation activation without the administration of an exogenous adaptogen. The researchers here studied the indices of free-radical lipid oxidation and antiradical defense of the brain in the development of long-term adaptation to chronic emotional and pain-related stress in three groups of rats—the first group subjected to stress for one week, the second for two weeks, the third for three weeks. The data produced was compared against corresponding blood serum indices and changes in certain physiological parameters in the process of adaptation. Only the first group underwent the three-part process of alarm, resistance, and exhaustion, with a drop in relative mass of the thymus, spleen, and adrenal glands; ulceration of the stomach was produced in 23 percent. Phase changes in arterial pressure and Hildebrand index were a function

of duration of stress. Three stages of long-term adaptation are described: the transition from emergency adaptation to long-term adaptation, the long-term adaptation itself, and the beginning of the transition to exhaustion. The researchers note that a sharp increase in serum superoxide scavenging precedes the growth in dismutase activity of the brain, while the accumulation of conjugated dienes begins in the serum before it begins in the brain. After one week of stress, the accumulation of Schiff bases is at its maximum, with the lowest level of activation of superoxide dismutase in the brain; whereas the minimum accumulation of fluorescing products corresponded to the second week of the maximum activation of the enzyme. Two figures, 12 references: 8 Russian, 4 Western.

UDC 615.31:547.943].03:616-008.922.1].076.9

Pharmacological Correction of Experimental Alcoholic Embryopathy

18400191e Moscow BYULLETELN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 8, Aug 88 pp 178-180

[Article by M. G. Ayrapetyants, O. L. Levina, L. V. Nozdracheva, and I. A. Kolomeytseva, Laboratory of Experimental Pathology and Therapy of Nervous Activity and Laboratory of Morphology of the Central Nervous System, Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] In a search for an efficient treatment that corrects disorders arising in progeny as a result of the pathogenic action of alcohol on the fetus, the authors studied the effects of a synthetic analog of enkephalin, dalargin hexapeptide, on mongrel rats. Dalargin was found to have a corrective effect in the treatment of disorders caused by alcohol intoxication during the intrauterine period. When both the mother and the progeny were treated, dalargin improved conditioned reflexes and helped normalize tissue respiration in antenatally alcoholized animals. The authors feel that hypoxic phenomena exist in the brains of antenatally alcoholized animals and that dalargin's therapeutic effects are probably due to its antihypoxic properties, its neural growth properties, and its ability to stimulate repair processes of the body. Two figures, 10 references: 8 Russian, 2 Western.

Instrument Making Ministry Lags in Producing Medical Equipment

18230074 [Editorial Report] Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian for 11 September 1988 carries on page 3 a 1600-word article by TASS correspondent S. Turanov, special for SOTSIALISTICHESKAYA INDUSTRIYA, entitled "Profit vs Kindheartedness." Turanov describes the difficulty the medical establishment is experiencing in getting enough equipment such as electrocardiographs, x-ray and tomography apparatus, and instruments for brain scans and other neurological diagnoses. Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] produces 70 percent of this equipment, according to Turanov. He quotes the director of the All-Union Scientific Research and Experimental Institute of Medical Equipment (VNIIIMT) B. Leonov, who states that a government decree would oblige Minpribor to develop new medical instruments, but from the proposal to implementation of such a decree would require 3-4 years. Even then, Leonov adds, enterprises could still get around it. Money is one reason—creation of a prototype is paid for by a centralized fund whose resources are insufficient. If a new piece of equipment were to be developed, its acceptance for series production would take at least 10 years. Although a recent decision called for the USSR Ministry of Health to pay for such development work, there is still no guarantee that a prototype will end up in series production. According to Turanov, one out of every three pieces of equipment, recommended by the USSR Ministry of Health for use in medical practice is not manufactured. Domestic equipment is not only in short supply, but it is unreliable and does not measure up to world standards and there is not enough foreign currency to buy the necessary amount of imported equipment.

However, Turanov adds, the USSR Council of Ministers recently adopted a decree "On Priority Measures for Raising the Technical Level and Increasing the Production of Medical Equipment Items and Improving Their Supply to Healthcare Institutions in 1988-1995 and up to the Year 2000." This decree provides, among other things, for a 10-fold increase in the output of medical equipment by the year 2000. The article concludes with the following editorial note: "With this publication, SOTSIALISTICHESKAYA INDUSTRIYA and TASS are beginning a joint action dedicated to the problems of developing the production of medical equipment and medicines." It invites readers to write or call the newspaper or TASS with comments, wishes or suggestions.

Increase in Agrochemical-Related Disease Predicted

18400111 Baku BAKINSKIY RABOCHIY in Russian
7 Sep 88 p 3

[Article by K. Shakhvaliyev, Azerinform correspondent]

[Text] The pursuit after new records in Azerbaijan agriculture that began in the 1970's has resulted in an

outbreak of congenital bone diseases. This is the conclusion reached by a group of physicians from the Baku Traumatology and Orthopedics Scientific Research Institute, who conducted a joint study with scholars from the Azerbaijan Machine Building Institute and the Mathematics and Mechanics Institute of the AzSSR Academy of Sciences.

Based on a study of more than 30,000 case histories of diseases experienced by inhabitants of virtually all of the republic's regions, regularities in the way these diseases are propagated have been discovered. It turned out that the overwhelming majority of patients live in those agricultural regions where the violations of sanitary norms concerning the use of pesticides and chemical fertilizers have been violated most flagrantly as well as in those cities with seriously strained ecological conditions. Azerbaijan has won the dubious honor of first place in per-hectare pesticide use. The sanitary norms for cotton and vegetable plantations have been exceeded dozens of times over, and the norms for grape plantations have been exceeded nearly a hundredfold. The highly toxic pesticide DDT, whose use was officially banned in 1970, was not used for another single year after this ban. The researchers studied the long-term consequences of the excessive use of chemical field treatment.

A computer program to discover the harmful pathology of the osteoarticular apparatus was developed through the joint efforts of specialists having different profiles.

"It uses a statistical probability research method," says E. G. Shakhbazov, lab head at the Azerbaijan Machine Building Institute and candidate of technical sciences, "that made it possible to establish that the peak morbidity occurred in 1980. The forecast developed up to the year 2000 suggests that, unless emergency measures are taken to make the environment more healthy, the number of such diseases will increase further—by more than 40 percent in some areas."

This study is the first attempt in the republic to determine the "breadth" of medical geography, which is at the crossroads of two sciences. However, the researchers are experiencing rather complicated problems in conducting the study seeing that so far it has been conducted by their sheer enthusiasm.

"We sent the data obtained to the Azerbaijan Council of Trade Unions and Professional Associations [ASPS], which allocates the resources needed to conduct work to improve sanitary conditions in regions of the republic," says O. A. Ismaylov, director of the Baku Traumatology and Orthopedics Scientific Research Institute. The research conducted has also made it possible to refine the prospects for developing orthopedic services in the republic. It is obvious that the institute needs more specialists in the prevention and treatment of hereditary diseases. It is necessary to increase the professional training in early detection of congenital pathology that is provided to physicians in medical institutes and in

maternity and pediatric medical institutions where they could fight diseases in the fetus. In addition, a nonstandard program that was developed jointly with mathematicians will, in the near future, determine with a high probability the degree of morbidity risk of hereditary diseases in the republic's regions."

The long-range program entitled Health [Zdorovye] that is being developed in the republic provides for a significant improvement in preventive medical examinations of rural laborers, a reduction (and in most cases, the elimination) of the use of highly toxic pesticides, and the tightening of sanitary control over the use of all chemicals.

Problems and Prospects of the Use of Mass-Application Computer Hardware in Health Care

18400164 Moscow VESTNIK AKADEMII MEDITINSKIKH NAUK SSSR in Russian
No 7, Jul 88 pp 70-75

[Article by I. A. Katysheva, Institute of Computer Technology Problems, USSR Academy of Sciences, Moscow]

[Excerpt] [Passage omitted] 1. Features of the computerization of health care

The experience of recent years has shown that carrying out mass social and medical programs on a new, high-quality level (such as, for example, mass health screening of the population, mass training with use of only old, traditional forms of medical servicing) is extraordinarily difficult today. This is due to the steady increase in the volume of medical and social information and to the complication of the methods, instruments, and equipment that is being used.

The computerization of health care is a complex technical, technological, and social process. We will note some of the important features that could be called features of the social tension associated with the computerization of health care.

1. The principal methodological apparatus that all who work in the field of computerization of mass health-care processes must represent very clearly is that no computer—not even the most advanced—will ever replace the physician or his direct contact with the patient. The medical professional will always bear the moral and legal responsibility for the health of the patient.

2. For a while longer yet, only some of the health-care services will have computer hardware. About 1.2 million personal computers (PCs), for example, will be produced in the USSR by the end of the five-year plan in the USSR; while, according to preliminary calculations, outpatient-polyclinic facilities alone will need about 1.5 million PCs (35-45 PCs per 37,000 patients). A discrepancy is developing in terms of professional opportunities and professional competence between medical workers

who use computers and those who will initially be deprived of the opportunity of using a PC. Correction and refinement of evaluations and criteria of the quality of work of personnel are needed. On the other hand, experience in the use of computers abroad shows that skill levels drop in some medical workers who rely entirely on computers.

3. It is obvious that the computer can do a great deal of the physician's routine work—providing him both with a computerized case record and with the opportunity to get, upon request, any information (on medicinal preparations, for example, or on various reference documents) from the data banks—and much more. And this, of course, frees a certain amount of time, which the physician can devote to the patient. But in this situation, the computer can become a barrier that prevents contact between the physician and the patient. This must be kept in mind especially in the work of pediatricians, psychiatrists, and certain other specialists.

4. Computers are, at this point, already being introduced at all levels of medical education: in the training of mid-level medical personnel, in VUZes, and in the system for retraining personnel and updating the skills of medical workers. It is important to keep in mind that the restructuring of consciousness and the adaptation to new forms of training in people who received their education in the traditional forms are much more complex than in yesterday's schools. For that reason, especial attention must be paid to the curriculum and the orderly provision of computer training courses in the system of medical education; otherwise, the training will not only not be of any benefit, but may also have a negative effect. For example, the program "Foundations of Information Science and Computer Hardware," which had been developed for general-education schools, was recommended for medical schools. The Main Health Care Administration of Moscow conducted an experiment in teaching this course in medical schools in Moscow during the 1985/86 school year within a special program developed at the USSR Academy of Sciences' Institute of Information Science Problems and adapted to the needs of health care. The results of the experiment indicated the correctness of the means chosen.

5. Being in conditions of "computer control" raises the professional output of the medical worker, on the one hand, and constantly forces him to responsibly relate to his duties, on the other. When, for example, an analysis of morbidity was done in one Moscow polyclinic on the basis of computer data and district therapists, marked discrepancies were found. Their identification by the polyclinic administration indicated the less than conscientious work of certain polyclinic personnel, and it was pointed out to them. This suggests the need for serious work in restructuring consciousness in the new conditions of activity.

There is yet another important problem whose solution is largely dependent on the success of the computerization of health care. It is of a general nature and has to do

with the ideology of the computerization of our society as a whole. As noted at the 9th International Congress IFIP-83,¹ the effectiveness of the use of new technologies and new classes of computer hardware depends on the level of readiness of the country in general for broad use of mass-produced equipment, and this requires the creation of readily accessible, high-quality software and economically based technical solutions in the area of series-produced mass-application computer hardware. For that reason, in the next section, we go into a little more detail on PCs.

II. Personal computers

In the last decade, mass production of a new class of computer—the PC—has evolved in the United States, Japan, and countries of western Europe. These computers are becoming the primary means of mass automation and amplification of the individual functions and possibilities of man in his social and industrial environment.

As experience abroad in the application of microcomputers in medicine and in the sphere of social welfare^{2,3} shows, the introduction of computers in nonindustrial spheres such as medicine and health care helps speed their development.

PCs have the following features:

- smallness, as a result of the use of microprocessors and a new generation of peripheral equipment (such as compact memories on floppy magnetic disks and hard magnetic disks; printers with graphics capabilities); high level of reliability, as a result of the use of microcircuits with large scales of integration (LSI and VLSI) and a high density of electronic components on the boards and the use of few moving mechanical parts in the assemblies; the functional trend among basic and special-purpose PCs is simplicity of use and operation.

The areas of predominate application of PCs can be determined from an analysis of the market of PC packages existing abroad, including operating systems, integrated system packages, and programing languages: system programs, 25 percent; control process automation, nearly 15 percent; spreadsheets, nearly 15 percent; administrative management, 5 percent; engineering and technical calculations, 10 percent; word processing, 7 percent; games, a little more than 20 percent; and others, 3 percent.

It should be noted that nearly 10 percent of the PCs are designed to use the simplest programming languages.

A feature of the state-of-the-art of work in the area of computer hardware is the parallel growth of two trends in the design and application of PCs: mass application of simple 8- and 16-bit PCs with inexpensive network organization (school and home-use PCs with an overall length of network of 100-150 m) and wide use of

fundamentally new PCs for processing the results of intelligent interaction between man and a data base or expert systems (16- and 32-bit PCs with larger memory, high speed, and advanced software).

The role of large and small computers is not diminished in the mass application of PCs. PCs make it possible, first, to sample data at the lower levels of hierarchy of a computer system (for more efficient use of the capacities of large computers) and, second, to use these computers as intelligent terminals (with the use of software for large and small computers, tying into the global networks of the institutional and interinstitutional types).

The PC should play a special role in integration with medical instruments and equipment, which is becoming possible thanks to advanced interface equipment. It should be noted that mass integration entails alteration of the organizational and information structures of the mass processes in health care and a reexamination of the requirements for unification and standardization of equipment and gear and the methods of their use.

Most PCs produced in capitalist countries have hardware and software for creating complex computer information systems. They are linked by local networks or with communications facilities (such as electronic mail). Such an arrangement of PCs makes it possible, first, to solve problems of greater complexity that require constant exchange of data and, second, to tie into large computer systems in order to get additional information or additional capacity. Moreover, thanks to the flexibility in PC use, the time it takes before a computer becomes obsolete is extended substantially.

The most important condition enabling the mass production of a PC is the development of inexpensive microprocessors. The production of reliable and inexpensive peripherals (monitors, keyboards, floppy and hard disks with sufficient memory) plays an important role in this.

It should be noted that the software created abroad may be either produced for specific PCs or may be oriented to the machine-independent nature of the program product that corresponds to the basic capabilities of operating systems.

III. Prospects of the Development of the PC in the USSR

In recent years, several important decrees have been adopted that affect the development of computer hardware of massive application.

It has been proposed that production be set up for 4-5 monitors (black-and-white and color) with varying resolution, from 256 X 192 to 1000 X 1000 screen dots; for dot matrix printers designed for standard printouts (80 characters per line) and wide printouts (160 and 240

characters per line) with graphics capabilities; floppy-disk storage units (256 or 360 kilobytes) and hard Winchester disk storage units (12 megabytes); and graph plotters.

The program for the prospective models includes the development of optical and magnetooptical disks with 1 gigabyte memories; semiconductor memories (with internal electronics operating like external memories); and magnetic domain cylinder memories.

The production of three types of network equipment is being proposed: (1) simple networks (inexpensive networks based on the ordinary 2-strand cable) for the equipment in school computer-aided instruction offices (the maximum length of such a network, based on 16 computers, is 100-150 m; the transfer rate within the network is 0.01 mbyte/s); (2) networks designed for the automation of an institution, with as many as 128 computers (the maximum length of such a network is 800 m; the transfer rate within the network is 0.16 mbyte/s); and (3) distributed, collective-use networks (the maximum length of the network is 1,600 m; it is designed for 512 computers; the transfer rate is 1 mbyte/s).

Basic classes of operating systems (OS) and basic application software (functional packages) are being developed for all the types of PCs that are planned for series manufacture.

The basic operating systems are CP/M 86 and MS-DOS. IBM-PC computers operate with these operating systems. Work is being done to develop their unified consolidation. Language support is provided by BASIC, Pascal, SI, and FORTRAN. Operating with the RAFOS operating system are Elektronika computers, which employ unified user-oriented languages. The CP/M 80 system will also be used (in the Mikros), with a full repertoire of language support: BASIC, Pascal, FORTRAN, and SI, as well as PROLOG and LISP.

The INMOS unified mobile (i.e., not relying on machine characteristics) system is being developed for 16- and 32-bit machines. The functional packages (word processing, spreadsheets [tablichnykh form grafiki], and data bases) operate both with the basic operating systems and with INMOS.

Generators of occupation-oriented programs constructed from specific modules of application software are being developed for solving complex problems that are aimed at specific subject areas.

Special-purpose program packages are being developed in order to create individual designs with hardware and software.

Three groups of computers are ready for series production: educational, institutional, and occupational computers (the Korvet, UKNTs, Iskra-1030, Iskra-1031,

Neyron, YeS-1840, and YeS-1841). The manufacture of special computers for use in medicine is not anticipated. Of those enumerated above, some will be used in medical education, others in health care practice, and others in, for example, scientific research and process control.

Accordingly, it is important to have a clear idea of the classes of tasks that a computer can handle in order to acquire the requisite knowledge of the hardware and software base for series-produced equipment and to effect auspicious training of medical staffs that are ready to use computers in the workplace.

Such work, undoubtedly, can be done only by a group of specialists who work in the field of medicine and information science and through the combined efforts of the USSR Academy of Medical Sciences, the USSR Academy of Sciences, and the USSR Ministry of Health. The USSR Ministry of Health must be the social client of a theory of PC use in health care, a theory in which all the functional requirements for the hardware, software, and ergonomic support of the PC are presented for all basic types and classes of problems being solved in medicine and health care. Among other things, the computer hardware now in use must be properly coordinated with the hardware that is being proposed for use, and questions of the adaptation of existing software and of the development of new software must be examined.

The theory is a general program document that has its own special forms of expression in the various spheres of health care and general methodological positions on the automation of medical and social processes in health care.

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Means of Improving Mass Health Screening
18400176a Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian
No 8, Aug 88 pp 32-37

[Article by Professor A. M. Petrovskiy, L. M. Manukyan, Candidate of Medical Sciences V. K. Olshanskiy, Professor O. V. Grinina, Candidate of Medical Sciences D. I. Kicha, Control Problems Institute, Moscow City Poly-clinic No. 78, University of Friendship of Peoples imeni Patris Lumumba, Moscow]

[Text] The immense scale of the task facing mass health screening of the population requires, according to the authors, the use of systems analysis, control theory, and state-of-the-art computer technology. The current system of mass health screening entails two stages: identification of individuals with elevated risk and individuals who have, or are suspected of having, a given disease; and referral of those individuals to specialists. Since the first stage must handle an enormous number of people,

but the more sophisticated medical skills and medical equipment reside in the second stage, the authors suggest that the use of computerized expert systems in the first stage—such as those being tested at city polyclinic No. 78 and the No. 15 hospital in Moscow—can take some of the load off lower-echelon medical professionals by taking medical histories, helping to place individuals into risk groups, and providing individualized recommendations about making one's lifestyle more healthy. Computers such as the Iskra-1030, the SM-1810, and the YeS-1840, which the authors say will soon be mass-produced, appear to be well-suited for such use. The authors also suggest that, owing to the shortage of computers and the pressing need to implement mass health screening quickly, some sectors of mass health screening (rural areas and small towns) may be without computers in the beginning, but must be able to convert to their use at some point. Large industrial centers, they suggest, should develop computerized systems that have access to collective-use computers or should acquire mini- or microcomputers from patron scientific and industrial organizations. Sixteen references: 10 Russian, 6 Western.

Work of the Kokchetav Remote Cardiological Consultation and Diagnostic Center
18400176b Alma-Ata ZDRAVOKHRANENIYE KAZAKHSTANA in Russian No 8, Aug 88 pp 49-51

[Article by B. S. Zhanadilov, Ye. I. Doroshenko, and L. P. Pinyugina, Kokchetav Oblast Hospital]

[Text] Remote cardiological diagnostic service is said to be finding increasingly wider use in the Soviet Union, and, with the increase in diseases of the circulatory system, the service is acquiring greater significance in the Kazakh SSR. Some 405,700 individuals live in the Kokchetav Oblast, which covers 78,200 sq km. There are 16 central rayon hospitals (CRHs), but nine of them are 100-225 km from the oblast hospital. The Kokchetav Remote Cardiological Consultation and Diagnostic Center was set up in 1983. Since not all central rayon hospitals have a cardiologist and a functional diagnostician, the Center was initially linked with three therapy departments and CRH EKG offices and, later, with three district hospitals and the resuscitation department of the Shchuchinskij sanatorium. The Center began 24-hour operation in 1985 and is equipped with a Volna receiver unit. It is linked by phone to all CRHs in such a way that it has access to virtually every patient in the hospital. The Center provides emergency consultation and diagnostic care, intensive care, and EKG services. It maintains a card file on myocardial infarction patients. Since 1983, the Center has done more than 10,000 EKGs and has examined nearly 8,000 individuals. Some 1900 individuals have been diagnosed with ischemic heart disease; 547 of them, with myocardial infarction or scarring after MI. One reference (Russian).

Virtual Eradication of Leprosy in USSR

18400195 Moscow IZVESTIYA in Russian

24 Jan 89 p 6

[Article by V. Ardayev: "Behind the Wall of Leprosy"]

[Text] Kzyl-Orda Oblast—Chief physician A. Kadrybayev believes that "the idea that leprosy means the lifetime isolation of patients afflicted with that disease has today become thoroughly outdated."

There are aspects of life about which we are not that knowledgeable, and moreover, prefer not to think about. Leprosy. Just to mention that terrible disease of the ages strikes fear in us. In all times it has been surrounded by mystery since it carried off its human victims to a doomed dwelling place.

"Lepra" in Greek is leprosy. Quite a few mysteries have been associated with the disease until this very day. For example, for a long time it had been considered a "fishermen's disease." The breeding grounds of infection have been, as a rule, in the mouths of large rivers such as the Syr-Darya, the Amudarya, the Ural, the Volga, the Don, and the Kuban. Why that is so is not known. The etiological agent of the disease is the Hansen's bacillus which is almost exclusively cultivated in humans and in no way adapts to animals. The bacillus is not very hardy and quickly perishes when exposed to fresh air and direct sunlight, and is easily removed from the skin by very simple hygienic procedures. One need only thoroughly wash one's hands with soap. There have been no known cases where a medic contracted leprosy. However, we do know that infection is enhanced by prolonged contacts with patients, poor nutrition, avitaminosis, strenuous physical work, supercooling, and excessive overcrowding.

The control of leprosy is very difficult. The incubation period of the disease can last for decades. According to anti-epidemiological standards, even the infectious breeding ground is not disregarded until 25 years have elapsed since the death of the last patient. Until now we do not yet know precisely the "entry gates" of infection. Does the infection take place via the respiratory tract, the digestive system or through the skin?

Nevertheless, leprosy today is curable, particularly in the so-called tuberculoid form which is the most moderate and which is considered benign. After several months of intensive treatment a patient can be discharged from a leper hospital under the observation of physicians. Every year he must undergo examinations and reinforcement treatment. The situation is worse in the case of the malignant variety—the lepromatous form whose treatment takes from five to ten years.

The last case of leprosy was recorded in Kazakhstan two years ago. Nevertheless, leprological expeditions continue to examine previously identified breeding grounds

on a regular basis. As early as in the 1960's a leprosy hospital was expanded to accommodate 680 beds, but today there are only 200 and not all of them are occupied.

There is one more riddle to leprosy—the so-called lepro complex. That is, persons who had suffered from this disease very frequently strive to live near each other and avoid contact with healthy members of society. Approximately 500 persons who have been discharged from a leper hospital live in a nearby settlement and prefer not to move anywhere else.

Life in a leper hospital takes its course. The patients are visited by their relatives. A special visiting room has been set up for them. On the grounds next to the hospital buildings people are tilling beds and growing vegetables for their own needs. Able-bodied persons work as firemen, electricians, and sanitation workers. People get married here and children are born. At one time there was even a pediatric leper hospital, but there is none now since there are no children patients. But there is a pediatric department which has been moved beyond the perimeter of the hospital. There children of leper patients live and study at the boarding house-school and are under constant medical supervision. Subsequently, they will not have to be subjected to any restrictions.

In the middle of the 1960's the leper hospital was moved to a section of Syrdarinskiy Rayon. A single brick structure (the main wing) was surrounded by a dozen frame cane-like small stoves whose maximum service period was not more than 15 years. It was crowded in the four- and five-person tents, and yet people lay here not for weeks, but for months and years.

Every year the Kazakhstan Ministry of Health allocates 50,000 rubles to the leper hospital for construction projects. But even that miserly sum remains unused. In past years workers hired for repair work as a rule came from former patients. That is now forbidden.

Leprosy in our country has been localized and halted but not conclusively defeated. Because there is no medicine that can guarantee that there never will be a recurrence of the disease, and because there are these people who are living both within the leper hospital and outside it...

Preventing the Spread of AIDS in the Ukrainian SSR

18400295 Kiev V'RACHEBNOYE DELO in Russian No 9, Sep 88 pp 1-3

[Article by Yu. P. Spizhenko, deputy minister of health of the UkrSSR]

[Excerpt] [Passage omitted] In connection with the identification of foreign citizens who are seropositive for HIV and who are studying in the Ukrainian SSR and with the possibility that health care agencies and the Kiev Scientific Research Institute of Epidemiology and

Infectious Diseases imeni L. V. Gromashevkiy—the head institute for the problem of AIDS—could bring the AIDS infection into the territory of the republic, an immense amount of organizational work has been done to prevent the spread of the disease in the republic.

Measures have been in place since 1987 for the prevention and treatment of AIDS, a task that has assumed paramount importance among the activities of health care agencies and institutions as well as of medical science. At blood-transfusion centers, certain oblast clinical hospitals, the Kiev and Lvov hematology and blood transfusion scientific research institutes, and the Kiev Scientific Research Institute of Epidemiology and Infectious Diseases, special diagnostic laboratories have been created, centers for confirming AIDS test results have been set up, and the population groups that need to be examined first have been identified. Those groups include the following: foreign citizens studying in the UkrSSR; Soviet citizens returning from lengthy foreign assignments (longer than three months); blood, plasma, sperm, and organ donors; high-risk-group individuals—homosexuals, prostitutes, and drug addicts, for example; individuals who have had contact with AIDS patients or with those who are seropositive for HIV; individuals with venereal disease; and, among others, hemophiliacs. A great deal of work has been done in conjunction with the Ministry of Internal Affairs, the Department of Visas and Registration [OVIR], and other services and agencies in order to examine risk groups.

In all, 663,258 donors and 115,558 other individuals had been tested for HIV in the republic as of March 1, 1988—with 101,909 of them tested at the Kiev Scientific Research Institute of Epidemiology and Infectious Diseases alone. As of April 1, a total of 91 individuals seropositive for HIV had been recorded, 78 of them foreign citizens, 13 of them USSR citizens. In the latter group, most were individuals who had a promiscuous sex life.

The organizational and diagnostic work associated with identifying individuals seropositive for HIV is being conducted under the scientific and procedural guidance of the Kiev Scientific Research Institute of Epidemiology and Infectious Diseases and its enzyme immunoassay center, which have developed a training program and are training medical personnel in the diagnostics, clinical picture, and prevention of AIDS (more than 100 specialists); a number of procedural materials have also been prepared.

Thus, fundamental to the battle against AIDS are preventive measures that should be conducted differentially for the various risk groups and the population as a whole, including mass screening for HIV, especially of donors, pregnant women, and individuals suspected of having AIDS. We need a single-minded health education campaign that promotes a healthy lifestyle, especially among our youth. Medical personnel involved in providing timely identification not only of individuals with AIDS,

but also of those with infectious HIV should be specially trained. Only a close coordination among Party and Soviet organizations, health care organs and institutions, scientists, and the entire public will put a stop to the continued spread of the "plague of the twentieth century."

Discussion of Nitrate Levels in Vegetables
18400176c Moscow ZDOROVYE in Russian No 10, Oct 88 pp 4-6

[Article by N. Savina: "How Do We Cut Through the Gordian Knot: How Long Will We Be Poisoned by Nitrates?"]

[Abstract] A Soviet dietary hygiene commission in 1988 made recommendations on maximum allowable levels of nitrates in fruit and vegetable products that put the daily nitrate intake for people in the country's midsection and in the Far North at no more than 300-325 mg. In the southern republics, where fruits and vegetables are a much larger part of the daily diet, the republic ministries have been directed to ascertain nitrate levels in products. Although nitrate levels are said to be, in most cases, much lower—or at least no higher—than those in CMEA countries and developed capitalist countries, and procedures for checking nitrate levels in fruit and vegetable products during inspection and approval by procurement agencies were approved by USSR Gosagroprom and the USSR Ministry of Health in March 1987, comments by USSR Minister of Health Ye. I. Chazov suggest that the levels are still too high. A. Ya. Kozelkin, department head at the State Inspection for Procurements and Product Quality of Gosagroprom, is quoted as saying that producers are still more interested in fulfilling quotas than in producing quality products, there are not enough testing centers, legal responsibilities are not clear, and there is no legislation that provides adequate punishment for elevated nitrate levels (refusal of products is the only penalty). The writer also elicits comments from officials of the Dzerzhinskiy Wholesale-Retail Production Association.

UDC 616-006.04(575)

Adverse Economic Impact of Malignancies in Uzbek SSR
18400178a Tashkent MEDITSINSKIY ZHURNAL UZBEKISTANA in Russian No 8, Aug 88 (manuscript received 9 Apr 87) pp 3-5

[Article by N. K. Muratkodzhayev, D. B. Feygina and K. M. Tulyaganova, Scientific Research Institute of Oncology and Radiology, UzbekSSR Ministry of Health]

[Abstract] A statistical analysis was conducted on the economic losses sustained in the Uzbek SSR due to cancer mortality, based on an assessment of the reduction in productive lifespan. The methodology involved a comparison of actual vital statistics with putative figures that could reasonably be expected if a given cause of

death, i.e., malignancy was to be eliminated. The resultant data demonstrated that in Uzbekistan elimination of cancer as a cause of death would enhance the productive lifespan of males by 0.32 years and of females by 0.17 years. It was further shown that in the Uzbek SSR the malignancy responsible for the most serious economic losses to society is currently gastric cancer (17 percent of total loss), followed by lung cancer (14.5 percent) and malignancies of the lymphatic and hemopoietic systems (14.4 percent). Among females the highest ranking malignancies were those affecting the generative organs (17.7 percent), lymphatic and hemopoietic systems (14.1 percent), the stomach (13.1 percent), and breast cancer (10.7 percent). Figures 1.

UDC 614.2:008(47+57)

Consultation and Diagnostic Centers as Efficiency Factors in Health Care

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 88 (manuscript received 14 Aug 87) pp 16-18

[Article by I. I. Pestrikov, A. G. Yanovskiy, N. G. Dedova and N. M. Novikova, Moscow]

[Abstract] In the light of perestroika in Soviet health care, the establishment of combined consultation and diagnostic centers appears as one of the more progressive steps in improving health delivery to the Soviet people. In view of this, a careful study was conducted on the performance of such a center located at the No 23 City Hospital of the Zhdanov Rayon in Moscow. The center receives referrals from 4 polyclinics serving adults in 4 Moscow rayons. Despite the promise of efficiency, the actual data showed that the center was plagued by administrative shortcomings, leading to referral of unwarranted cases, duplication of diagnostic procedures, poor maintenance of patient statistics, and unnecessary testing. By and large, these problems stemmed from a lack of clear definition of responsibilities and duties, and a virtual absence of communication between the referring physician and the center. The results suggested that a center of this type, designed to provide both consultation and diagnostic expertise, should cover at the very least 15-17 medical specialties, with every referral confirmed by a physician-in-charge. Careful documentation and statistics must be maintained on patient loads and diagnostic tests to substantiate financing and indicate trends for future development and expansion of such centers in the Soviet health system.

UDC 616-08-039.57:681.31

Computer-Based Health Screening

18400256b Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, Sep 88 (manuscript received 16 Oct 87) pp 33-36

[Article by V. P. Golovchenko, I. A. Logvinenko, L. I. Ramzanov and P. N. Grin, Dnepropetrovsk]

[Abstract] Specialists at the No 18 City Hospital in Dnepropetrovsk, in conjunction with the Ukrainian State Planning Institute "Metallurgavtomatika," have

developed and implemented a computer-based data processing system for use in health maintenance. Intended for purposes of preventive health care, the system is designed to gather and collate data on health risk factors, identify groups at risk, and generate information on the health status of the population and measures to be taken to ensure efficient health screening. The system under consideration has become a component of the regional 'Zdorovye' health complex. As presently utilized, the processing time per week amounts to 3 h of machine time for a cohort of some 15,000 patients and is not dependent on the availability of personal computers, but is run entirely off a mainframe computer (series YeS). Figures 1.

UDC 616.2:008(470)

whole, there is obvious need for more public information and education, and clinical specialists should make it their obligation to encourage a positive attitude toward annual check-ups.

Public Attitude to KASMON-Based Health Screening

18400256c Moscow SOVETSKOYE
ZDRAVOOKHRANENIYE in Russian No 9, Sep 88
(manuscript received 21 Apr 87) pp 36-40

[Article by G. S. Popov, S. L. Solomonov and M. S. Paegle, Riga Medical Institute; All-Union Scientific Methodological Center for Improving Complex Medical Examinations Through Use of Microcomputers in Comprehensive Medical Screening, Riga]

[Abstract] In 1984, KASMON [Kompleksnaya Avtomatizirovannaya Sistema Meditsinskogo Osmotra Nасeleniya]-based medical screening was implemented in Latvia. Running diagnostic algorithms on microcomputers such as the Iskra-1256 or the Iskra-226, the system made it possible to detect 15 key pathologies without the intervention of physicians in the actual diagnostic process and to identify groups at risk. The use of KASMON in Latvia led to a primary diagnosis in 25 percent of the surveyed cases in the first year of its implementation and to a primary diagnosis rate of 5 percent in the third year of its use. The use of this system made it possible to examine 72 percent of the Latvian adult population in mass health screening in 1984, a figure rising to 81 percent in the second year (1985) of its implementation. In 1985, a questionnaire study was conducted to determine public attitude toward the KASMON-based health screening as a way of assessing the public's perception degree of satisfaction, and confidence in the system. A total of 1222 individuals were surveyed, and 70.4 percent regarded health screening as a positive development in Soviet health care. The need for annual screening was questioned by 21.1 percent of the respondents, and 8.5 percent saw no value in preventive health care. These findings indicated that, at the very least, one-third of the population of Riga needed more health counseling and information as to the purpose and outcome of annual health screening. Although the KASMON system was judged to be meeting the needs of the populace on the

Tactics and Strategies in Restructuring Medical Sciences

18400260a Moscow ZDRAVOOKHRANENIYE
ROSSIYSKOY FEDERATSII in Russian
No 10, Oct 88 pp 8-13

[Article by V. N. Shabalin, corresponding member, USSR Academy of Medical Sciences]

[Abstract] Perestroika has affected the entire spectrum of Soviet social life, including the natural sciences. It is only natural, then, that special attention should be accorded to health care and the medical sciences in the light of perestroika, as medicine has a direct impact on the well-being of the Soviet people. A linchpin of perestroika is the emphasis on self-sufficiency and cost effectiveness. In that respect, the medical establishment of the USSR is in dire need of reform. To date, the USSR lags behind other developed countries both in the delivery of health care at the practical level, as well as in the implementation of research results. There is considerable misallocation of funds, with 50 percent of the annual medical budget going for salaries, and only 50 percent for medical equipment and instruments. In addition, the quality of Soviet medical instrumentation is not up to par, and the spectrum of available technologies lags far behind other advanced countries. One approach to overcoming indifference and laxity in health care is the introduction of the concept of responsibility, self-sufficiency, and cost effectiveness in combination with a fee-for-service approach. All this requires a radical transformation of attitudes and strong resolution to implement glasnost and perestroika in the medical sphere.

UDC 616.973-053.67-036.2-97

Life-Styles and Gonorrhea in Adolescence

18400260b Moscow ZDRAVOOKHRANENIYE
ROSSIYSKOY FEDERATSII in Russian No 10, Oct 88
(manuscript received 24 Mar 88) pp 28-32

[Article by V. K. Yuryev, Chair of Social Hygiene and Public Health Administration, Leningrad Pediatric Medical Institute]

[Abstract] In order to assess the correlation between life-style and the incidence of gonorrhea in adolescence, an interview-based study was conducted in the oblasts of the Northwestern Economic Region between 1982 and 1985. The survey encompassed all individuals with gonorrhea up to the age of 18, with control data derived from 1,780 families with daughters up to the age of 18 representing a complete sociohygienic spectrum. The

results of the analysis demonstrated that girls represented 57.6 percent of the adolescents with gonorrhea, and that chronic gonorrhea was encountered twice as often among girls than among boys. The average age of the teen-agers with gonorrhea was 16.4 years. In addition, 77.3 percent of the patients lived with their families. The economic status of the families was judged to be good in 24.5 percent of the cases, satisfactory in 71.4 percent cases, and poor in 4.1 percent of the cases. The corresponding control figures were 66.7, 28.8, and 4.5 percent. Alcoholism was a problem in 22.6 percent of the families with a teen-ager with gonorrhea, and only 33.0 percent of the afflicted adolescents did not abuse alcoholic beverages. In addition, 52.4

percent of the girls and 76.0 percent of the boys with gonorrhea were smokers. Finally, 29.2 percent of the boys and 29.0 percent of the girls had problems with the juvenile authorities, and almost half of them were not involved in social activities, such as the Komsomol. The gonorrheal cohort also did poorly in school (42.2 percent) and, generally, lacked proper sex education. Medical help was actively sought by 85.7 percent of the boys and by 13.6 percent of the girls. Considering the danger posed by AIDS, a study and analysis of the social life of teen-agers at risk for sexually transmitted diseases constituted an imperative in preventive health care. References 3 (Russian).

Medical Experts Refute Findings on Cancers Due to Chernobyl Fallout

18000694 Kiev PRAVDA UKRAINY in Russian
1 Mar 89 p 1

[Interview with R. A. Aleksakhin, V. G. Bebesko, I. A. Likhtarev, N. A. Loshchilov, A. Ye. Prisyazhnyuk and B. S. Prister, by A. Maslov: "Incompetence For Export"]

[Text] A group of scientists, famous specialists in various subspecialties of radiology, called the editorial offices and requested to air their opinion on a recent publication in MOSKOVSKIYE NOVOSTI (let us recall that this paper is published in several languages and almost all of its printing goes abroad). The article of journalist Vladimir Kolinko, "Radioactive Echo," 19 February, was under discussion. In brief, it stated that in the Narodichsky rayon of Zhitomir oblast the radiation conditions and the consequences of the irradiation were far more serious than has been officially maintained. Thus, the specialists are reproached for not paying enough attention to this rayon, openly minimizing the radiological danger, and doubt is also expressed competence of dividing local villages into "clean" and "dirty," since radioactive dust is carried from place to place by the wind. It is asserted that in this rayon, the number of cases of oncological illnesses had increased sharply, that domesticated animals have given birth to deformed progeny, etc.

In addition, these assertions were visually confirmed in the short film entitled "Microphone?" shot by director Georgy Shklyarevskiy.

Both the publication and the film had broad repercussions, abroad as well. Here is one of the responses from abroad:

"Dear Doctor Pyatak (deputy director of the All-Union Scientific Center for Radiation Medicine, USSR Academy of Medical Sciences—ed.) I hope that you will recall our meeting at Harvard last year. I learned from MOSKOVSKIYE NOVOSTI that in the Narodichsky rayon there are cases of thyroid illnesses. Were those children given iodine drops? Hyperthyroidism may develop in children with inadequate thyroids when given potassium iodide. Could this be the problem? We also learned from TASS, 9 February 1989, that the cancer morbidity in Belorusia had increased. This is obviously too soon for radiation effects. Or has the Soviet press simply been infected by the American inclination toward sensationalism? Richard Wilson, Physics Department, Harvard University, Cambridge."

Our discussion, which took place in the Radiation Center, included R. A. Aleksakhin, academician of the All-Union Academy of Agricultural Sciences imeni Lenina [VASKhNIL] and deputy director of the All-Union Scientific Research Institute of Agricultural Radiology, USSR State Agro-Industry (city Obninsk); professor B. G. Bebesko, doctor of medical science, Director of the

Institute of Clinical Radiology of the All-Union Scientific Center for Radiation Medicine of the USSR Academy of Medical Sciences; professor I. A. Likhtarev, doctor of physical-mathematical sciences, director of the dosimetry and radiation hygiene department of this Center; professor A. Ye. Prisyazhnyuk, doctor of medical sciences, director of the Center's Laboratory of Epidemiology and Radiation Effects; professor B. S. Prister, doctor of biological sciences, director of the department of the Southern Division of VASKhNIL.

[Likhtarev] I have MOSKOVSKIYE NOVOSTI here in my hands. Non-specialists probably had goosebumps after reading this article by V. Kolinko. And the specialists just shrug with irony. For example, here are the words of the first secretary of the Narodichsky raykom Anatoliy Melnik (he has now transferred to another job—ed.) that the major part of the radioactive substances was carried over great distances with the dust. That, so he says, is the source of all the troubles.

There were indeed errors on that score. In the very beginning of the Chernobyl accident, there were major Ukrainian scientists who were very pessimistic toward "zonal movement," the dispersal of radioactive contamination by the dust factor. Literally two months ago, the special expedition of the "Tayfun" scientific production association of the State Committee for Hydrometeorology and Environmental Control [Goskomgromet] presented its data; it has been studying this at a highly qualified level. It turned out that this movement was insignificant, even when conditions of powerful dust formation are created for it artificially. This is why special measures have not been undertaken to prevent "zonal movement."

[Maslov] How can this absence of migration of radioactive substances be explained?

[Likhtarev] It can be explained very simply. In order to raise from the ground into the air these same curies per square kilometer, more than a hurricane, a tornado would be needed. Only it would have the power to tear up the ground. Or, let's say, high temperature, as took place in the torch of the burning reactor. Had there not been this torch over unit four, with a temperature of over 1,000 degrees, then the radioactive fallout would have occurred in a small zone surrounding the station.

[Prisyazhnyuk] Let me cite again the opinion of the raykom secretary. "Our doctors have noted complications in chronic diseases among the population, a deterioration during surgical patients' post-operative periods. The average annual number of cancerous diseases has doubled, in particular, cancer of the lips and mouth." Further on, the publication's author queries, "Are we living in normal or extreme times?" This demands comment.

In 1986, in light of the increase of the population's migration due precisely to the events of Chernobyl, the quality of record-keeping of oncology patients living near the zone, including in Narodichi, was on a very low level. The number of registered cases had fallen to 49, less than in the previous year, but this remained unnoticed. Then in 1987, there were 94 cases, and they were immediately raised as an example. How can this be, a doubling of the morbidity rate? The local Party workers and the journalist drew far-reaching conclusions from this.

We have reviewed literally all hospital records. We managed to establish that the number of ill people in this region was changing at the same rate as in the oblast in general, as in the entire Ukraine. Our data are confirmed by official statistics as well, which noted that in 1988, the number of oncological patients fell to 74. As far as the manifestation of lip swellings are concerned, they are in general groundless, since in 1987 and 1988 only three such cases were registered. And in the previous years, up to seven cases had been noted.

[Maslov] So, it could be that this is caused by the migration of the population?

[Prisyazhnyuk] No, since lip cancer has been declining. This is one of the few forms of oncological disease which has been decreasing in frequency.

The situation is somewhat different with regards to mouth cancer. In previous years, one or two of these cases were registered, and in 1987, six. But this can be explained not by the radiation factor, but by the fact that the population is not receiving the level of stomatological assistance which it needs. And it depreciated considerably in 1986. It is dental caries which provoke mouth cancer. As far as thyroid cancer is concerned, there are only one or two cases annually, malignant swellings of the hemogenic lymphatic tissue, only four or five cases. In the whole republic!

[Bebeshko] I must say that we are not finished with the attention of the doctors of Narodichi, in spite of the journalist's confirmation. Five or six times a year, a team of rayon and oblast doctors travels to the villages, along with specialists from the clinic of anti-radiation defense of our Radiation Center. Here, literally all children are covered by the clinic. If, to our general misfortune, they were all examined, as a rule, by the same pediatrician, then now, their health is monitored by entire groups of specialists. It is understandable that some discrepancies would now be manifested.

Let us look at the birth rate. 1985—11.4; 1986—12; 1987—8.4; and finally, 1988—12.2 births per thousand in the Narodichskiy rayon population. The decline in birthrate for 1987 is connected with the processes of

migration. Average infant mortality in these same years: 1985—19.2; 1986—18.5; 1987—15.2; 1988—19.2 deaths per thousand children. As we see, the statistics are stable.

Now, about the part of the article, "The pig-tender carried the bug-eyed piglet out to the street so that I could photograph it, saying with tears in her eyes 'My daughter just got married. What will my grandson be like?' I did not dare to comfort this woman." Within the time intervals under discussion, the number of anomalies in the development of the juvenile population has not increased. It is now as it was before the accident. So where is a radioactive echo in all of this?

Now for the thyroid gland. Vladimir Kolinko writes that such illnesses have been noted in half of the juvenile population of the rayon. But this does not correspond to reality. Eighteen percent of the children of Narodichskiy rayon manifested thyroid gland hyperplasia, which is an aspect of the norm for a certain growth period. This level does not exceed that for territories in which iodine is endemic, including not only Narodichi, but all of Polessye, both Ukrainian and Belorussian parts. That is, a natural occurrence was taken for a disease.

[Maslov] And where do Doctor Wilson's concerns come in?

[Bebeshko] Potassium iodide can lead to hyperthyroidism if children take it over a prolonged period, a minimum of several months. Iodine preparations were administered for only a few days.

[Maslov] It is asserted in the publication, and I myself heard, that it is being recommended to women from these regions which have been subjected to radioactive contamination that they not give birth.

[Likhtarev] It happens that this is the easiest question to answer. Believe it or don't believe it, however you want, but there were no prohibitions regarding childbirth. It is possible that such recommendations were made on the level of the doctor in the rayon hospital during the turmoil of 1986. But neither the specialists in radiology, nor the public health leaders of the republic, or the oblast, ever made such recommendations. I repeat, they were not made.

[Aleksakhin] Vladimir Grigoryevich mentioned a well-known fact, that Polessye is an endemic region. Here, such trace elements as cobalt, iodine copper and others are in short supply. All of this may cause various anomalies in animals. Plus the use of large quantities of mineral fertilizers and pesticides. Plus poor efforts at cross-breeding. The publication's author examines only one factor in the manifestation of animal deformities—radiation. How can such serious conclusions be drawn from one fixation?

[N. Loshchilov] It states in the publication that the kolkhoz imeni Petrovskogo registered 140 animal deformities, if they are added up. In light of the publication of the article, we sent yet another group of specialists to this kolkhoz, in order to sort everything out on the spot, to register, as they say, how many and what kind of monsters had been born, and when. It turned out that among the calves there were not 62 freaks, as asserted, but only eight. There were somewhat fewer among the piglets. Yet what was surprising was that the department where the freak animals were born is located in a position more favorable in the sense of radiation than on neighboring farms. We conducted selected tests of literally every field, every pasture. With the exception of one 50-hectare field, there is not one patch of land in this kolkhoz where the radioactive cesium contamination level exceeded accepted limits.

In the neighboring "Chervone Polissya" and "imeni Lenina" kolkhozes, the feed contamination level was higher. Yet there was not a single freak piglet at the "Chervone Polissya" kolkhoz. Our affiliate has an experimental farm at the "Vladimirskiy" kolkhoz (the village itself was evacuated); there, we have kept 500 head of large horned cattle and 200 pigs, gathered from right near Pripyat. For experimental purposes, we feed them extremely contaminated feed from the evacuated zone. And there is not one freak among the progeny of this experimental herd.

The conclusion waiting to be drawn is that the animal deformities at the kolkhoz imeni Petrovskiy are not characterized by radiation. One more likely reason for the anomalies is close family cross-breeding. It happens that this is the first and foremost reason for the eye deformities noted in the publication.

[Aleksakhin] To elaborate: Untimely retirement of a producer to castrated boar leads to a situation where he is already breeding with his progeny by the third year. In this case, any genetic pathology may be conditioned.

[Loshchilov] A commission of the Ukrainian agricultural academy, headed by professor N. Sudakov, investigated three farms in the Polessye area in January, 1986, that is, before the accident. The commission established, that in 1985, among the 760 cows were 14 freaks, comprising about two percent. This same percentage is maintained even now. The commission tested the trace elements in the soil, the feed and the animals' blood. It turned out that the trace element enumerated earlier were present at levels 20-100 times lower than the norm. In addition, a nitrate level in feed beets was established at 20 times higher than the norm. The conclusion was drawn: animal deformities are the consequence of trace element deficiencies and excess nitrates.

[Prister] Today, every farm without exception has at its disposal information about the contamination of its territory. There is no sort of seal on this information. There is no sort of restriction. And this information

absolutely is not the property of the kolkhoz chairmen. How can the supply of pure milk be maintained, if people don't know the level of contamination of the land? After all, there could be a small section of a field at, say, the 40 curie level. All such spots have been found. Unless attention is paid to them, it is impossible to guarantee the production of pure products.

[Likhtarev] The article in MOSKOVSKIYE NOVOSTI is incompetence exported abroad. I met several times with a journalist from DER SPIEGEL. He wrote three articles on the events of Chernobyl. In the first, he had almost 15,000 Kievans lying dead from radiation in May, 1986. In the third article, he asked pardon, but who here will pardon that?

As far as the radiation of people is concerned, its structure depends not only on where a person lives, but on age and profession. It is understandable that foresters received a higher than average dose, and children, a less than average dose. So the residents of Narodichi received an annual dose in a band from the village of Ruden-Ososhen-Narodichi within the limits of 0.06 to 0.27 rems of external gamma radiation and from 0.27 to 1.17 rems internal radiation (on account of the products contained in radioactive cesium) while the emergency-admissible dose for 1987 was 3 rems annually, and for 1988, 2.5 rems annually.

Yes, we have registered eight people of 7,000 who have received over 5 microcuries. Each one of them is personally known, and it is known why these people have such a level of radioactive cesium. I would note that 5 microcuries in an organism over a year is an annual dose of about 0.8 rems. They are, as a rule, elderly people who don't want to do anything about changing their lifestyle. Well, he's had his one cow, and all his life he's drunk milk from his own cow, and doesn't want to start following any regulations now. Incidentally, there's nothing terrible about this. But a journalist must not go making generalizations on this. If he talks about how things really are, then, I think, everybody will understand what's what.

At the viewing, I told one of the leaders of the Zhitomir obispolkom who strongly defended the film straight out that one of his goals was to get more money for Narodichskiy rayon under the cover of an overwrought public. And why didn't he speak the same way to the government commission where these resources are allocated? He's usually silent there. The film only brings out more nervousness among the residents of Narodichskiy rayon. Kievans, upon seeing the film, just say, "Oh, my" but they still have to live there. And constantly worry.

[Bebeshko] Such publications only lower the population's level of trust in specialists in radiation medicine and hygiene. And imagine if some terrible thing were to happen let's say, near Narodichi. And how would we

manage to explain later that this had nothing to do with radiation; whatever quantitative information we publish, people would only say, "they're lying!"

[Likharev] It's probably impossible to accuse the rayon workers of having and erroneous point of view. But the journalist should have discussed the information with specialists. Can they really work on the principal of interviewing the first auntie Dunya they find on the street, and on that basis announce, "See, this is what the people are saying!" It was probably necessary to meet with the people who study such problems. Can moral goals really be attained with the help of immoral methods?

[Maslov] Of course, it was not very pleasant to hear the reproaches toward journalists. In searching for an answer as to why such an incompetent publication would appear in MOSKOVSKIYE NOVOSTI, one of our interlocutors noted with some irony that this must be the price of glasnost.

It would be much more precise, in our view, to say that this is the price of voicelessness. In stumbling over all manner of prohibitions concerning a range of data on the accident at the Chernobyl Nuclear Power Station [ChAES] during their collection and confirmation, journalist were forced to take circuitous routes. Unfortunately, not all of them led to the needed goal, as happened with our colleague.

On of the initiators of all possible barriers to full information on the ChAES was the USSR Ministry of Health. It is understandable why. It is, after all, easier to hide the real state of affairs than to insure the protection of people's health. The barriers were first and foremost the low level of our health maintenance system. This is why academician R. Aleksakhin noted in our discussion that the accident at ChAES concerned not so much radiation problems as social and moral problems.

UDC 615.849.1.015.25.076.9

Radioprotective Action of Mexamine During Fractionated Irradiation
18400177 Moscow MEDITSINSKAYA RADILOGIYA in Russian Vol 33 No 9. Sep 88 (manuscript received 2 Feb 88) pp 57-60

[Article by P. Kazymbetov, All Union Scientific Oncological Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Protective effectiveness of mexamine was evaluated under conditions of single and fractionated irradiation of mice. It was shown that optimal protection at a minimal effective dose was obtained with administration of the reagent 5 min prior to irradiation. The effectiveness of mexamine depended on the end points selected for evaluation. When survival from total body irradiation was taken as the end point, mexamine was

not effective. The best results were obtained when the end point was skin reaction to local irradiation. Considering the fact that mexamine's protective action against irradiation was negligible, the therapeutic index in case of single local irradiation was 1.26 and with fractionated exposure it was 1.45. Figures 3; references 14: 11 Russian, 3 Western.

UDC 577.391:591.1

Clinical and Physiological Study of the Phenomenon of Disturbance of Visual-Motor Coordination in Animals After Local Irradiation of the Head

18400245a Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 5, Sep-Oct 88 pp 666-675

[Article by I. B. Ushakov, B. I. Davydev, B. L. Razgovorov, A. N. Kordenko, V. P. Fedorov, M. M. Abramov, and V. A. Sapozhnikov]

[Abstract] The researchers irradiated 88 male cats and 87 dogs of both sexes in order to establish the radiobiological parameters of visual-motor coordination disturbances following irradiation of the head and to study the possible mechanisms of the phenomenon—the role of structural and functional changes in the central area of the visual analyzer and in the peripheral areas, the significance of shifts in cholinoreactive structures, and the contribution of inflammatory swelling of the brain. The animals were irradiated with γ -radiation in doses of 50-100 Gy. Early effects (measured in hours) and long-term effects (measured in days) were noted. Although the researchers found no changes in the peripheral area of the visual analyzer of the irradiated cats that could serve as a morphological substrate of the visual-motor coordination disturbances, they did note a number of serious structural and metabolic changes among neurocytes and vessels in the central area of the analyzer. They found catecholamine and alkaline phosphatase imbalances in cats with pronounced visual-motor coordination disturbances. Other morphological and histochemical parameters were altered in cats that did not show visual-motor coordination disturbances. The irradiation of the dogs resulted in considerable, early disturbances in brain structure. Marked changes were observed in the membranes of various organelles and in specialized structures such as neurofilaments and synapses. Immediately after the irradiation, the cytoplasmic network was observed to swell, become deprived of ribosomes, and degenerate. The mitochondria were substantially altered, with one end of the network suffering gross structural damage, and the other end of the network appearing entirely normal. Interneuronal contacts were altered, with pre-synaptic processes swollen and often containing very few vesicles. Structural changes in the blood-brain barrier appeared relatively early, especially in the astrocytic perivascular feet. The researchers concluded that the early visual-motor coordination disturbances were the result of multiple structural and functional effects in the

CNS, chief among them disturbances of the integrative activity of brain structures that were due to damage to nerve cell synapses; changes in the functioning of CNS

cholinoreactive structures; and disturbances in the hydration and electrolyte composition of the brain. Figures 3, references 18: 16 Russian, 2 Western.

UDC 578.832

Primary Structure of Genomes of Modern Hong Kong-like Strains of Influenza A/H3N2 Viruses
18400160a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 302 No 6, Oct 88 pp 1494-1497

[Article by USSR Academy of Sciences Corresponding Member L. S. Sandakhchiyev N. A. Petrov, M. A. Yakhno, T. Ya. Luzyanina, A. A. Grinev, S. K. Vasilenko, Ye. B. Grinbaum, D. B. Golubev, Ye. A. Govorkova, USSR Academy of Medical Sciences Member V. M. Zhdanov (deceased), All-Union Scientific Research Institute of Molecular Biology, Novosibirsk; Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow; All-Union Scientific Research Institute Influenza Studies, Leningrad]

[Abstract] Recent years have seen an increase in the frequency of the isolation of viral strains of a human influenza A related in antigen structure to the prototype strain A/Hong Kong/1/68, which was the pathogen of the influenza pandemic of 1968, but was later forced out of active circulation by other variations of the virus. This phenomenon has yet to be explained convincingly, apart from the suggestion that such "antigen anachronisms" appear as a result of constant contamination of the environment and material by laboratory strains. The most informative approach appears to be one based on a detailed comparison of the primary structures of genomes of viral anachronisms and genes of probable prototype strains. Using strains from the collection at the Cuban Ministry of Health's Institute of Hygiene, Epidemiology, and Microbiology, the researchers introduce data on the nucleotide sequence in the gene of the basic antigen HA protein of four influenza A/H3N2 viruses that were isolated between 1984 and 1987 and had been characterized earlier as Hong Kong-like antigen anachronisms. They also present the results of a comparison of selective primary structures of certain core genes of these strains and genes of the reference strains of 1968. The nature and arrangement of differences identified in the amino acid sequence of HA viral anachronisms indicates that they are probably related to changes in receptor properties and to inhibitor interaction rather than caused by antigen drift, i.e., antibody-induced selection of mutants in a partially immune human population. All the amino acid and nucleotide differences that were revealed point to the authenticity of the Hong Kong-like viruses the researchers studied. The specific mechanisms of preservation over the last two decades with virtually no mutation or re-assorting of genomes of human influenza viruses that episodically appear in the form of antigen anachronisms needs further study. Two figures, 10 references: 5 Russian, 5 Western.

UDC 616.5-002.525.2-039-07:616.153.962.4-097:578.828.6]-078.73

HIV-Reacting Antibodies in Systemic Lupus Erythematosus: False Positive Results or Indications of Viral Infection?

18400185f Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 4, Jul-Aug 88 (manuscript received 28 May 87) pp 504-509

[Article by Ye. L. Nasonov, L. Z. Aleksandrova, M. N. Korneyeva, S. K. Solovyev, A. A. Yanshin, A. M. Poveren-

ny, V. M. Zhdanov (deceased) and V. A. Nasonova, All-Union Cardiological Scientific Center, the Institute of Rheumatology, and the Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] The high incidence of antibodies reacting with HIV (human immunodeficiency virus; HTLV-III) in patients with systemic lupus erythematosus (SLE) in enzyme immunoassays has led to research to determine the relationship between SLE and HIV, i.e., whether SLE represents a viral infection or whether the issue at hand is a false positive phenomenon. In an attempt to define the relationship, a cohort of 58 male and female patients with SLE, ranging in age from 14 to 39 years, were subjected to a battery of immunological tests and DNA hybridization studies, and the results correlated with the published literature on the topic. On an overall basis, the data showed that many retroviruses show extensive serologic cross-reactions, but whether a retrovirus is involved in the pathogenesis of autoimmune diseases, in particular of SLE, remains a moot point. Despite the negative results of immunoblotting studies and the alleged absence of proviral DNA sequences in the DNA isolated from the lymphocytes of SLE patients, retroviruses cannot be excluded in a definitive manner as the etiologic agents in SLE. A comparison of a number of pathophysiologic parameters common to both AIDS and SLE (e.g., antinuclear antibodies, antibodies against cardiolipin, monocyte dysfunction, increase in the levels of acid-labile interferon, decrease in the number of SD4⁺ cells, etc.) does, however, indicate common pathogenetic mechanisms. On the basis of these observations, it appears that SLE is a valuable model for studying the relationship between immunopathology and viral infections. Figures 2; references 44: 8 Russian, 36 Western.

UDC 578.833.26.083.3

Detection of Lassa Virus by Passive Hemagglutination

18400185e Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 4, Jul-Aug 88 (manuscript received 29 Sep 86) pp 498-502

[Article by A. S. Vladko, L. P. Kramarenko, I. A. Cherednichenko and L. Ye. Sunkova, Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Health, Minsk]

[Abstract] A passive hemagglutination test was developed for the detection of Lassa virus, based on coupling of the immunoglobulin fraction from hyperimmune guinea pig serum to chicken RBCs. The red cells were fixed with 25 percent glutaraldehyde and used as a 50 percent suspension for coupling the immunoglobulins (10 mg/ml) via TDIC in 0.15 M Na₂HPO₄ buffer. The dianosticum was then utilized for monitoring Lassa particles in infected Vero cell culture and in 6-8 g outbred white mice infected by intracerebral injections

of 0.03 ml of a 20 percent brain suspension from infected mice. Passive hemagglutination and passive hemagglutination inhibition tests developed with the sensitized red cells allowed for the detection of infectious viral particles and antibodies generated against the virus in the mice. The data showed, in conjunction with tissue culture plaque formation assays, that viremia peaked on the 4th and 12th day after infection, with the titers on the 4th day corresponding to 4.2 log PFU/ml and on the 12th to 2.8 log PFU/ml. The highest levels of neutralizing antibodies were seen on the 6th and the 14th postinfection days, with the increase in the titers of neutralizing antibodies correlating with a fall in the titers of the infectious virus. Data obtained by passive hemagglutination and passive hemagglutination inhibition tests on the titers of the infectious virus and the antibodies, respectively, showed a similar pattern of reciprocity. Figures 2; references 17: 11 Russian, 6 Western.

UDC 615.373:578.833.1].012.6

Induction of Immune Sera Against No 230 VEE Virus by Immunization With Virus Concentrated With a Water-Polymer System

18400185d Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 4, Jul-Aug 88 (manuscript received 12 Mar 87) pp 490-493

[Article by V. G. Pomekova, Ye. E. Melnikova and S. Ya. Gaydamovich, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] In an attempt to secure a convenient method of preparing antibodies against the Venezuelan equine encephalomyelitis (VEE) virus, trials were conducted on the immunogenicity of viral preparations obtained by concentration of culture fluids with a water-polymer mixture. The specific methods involved concentration of No 230 VEE virus in culture fluids of chick embryo fibroblasts by a polyethylene glycol (4000 D) and dextran sodium sulfate (500,000 D) two-phase separation approach. Albino mice (20-22 g) were immunized intraperitoneally with the viral concentrate and tested by complement fixation. Immunization of the mice with the viral concentrate yielded immune ascitic fluid with titers that were 2- to 4-fold higher than those derived from mice immunized with the unconcentrated culture fluid. Whereas the highest titer obtained with the control mice immunized with the unconcentrated viral preparation was 1:160 in a few cases, 80 percent of the titers in the mice immunized with the viral concentrate were in the 1:160-1:320 range. Testing by passive hemagglutination and indirect immunofluorescence techniques also confirmed the efficacy of concentration by the water-polymer method, and demonstrated that a two-fold increase in the titers could be secured by the use of an Arlacet:Drakeol (1:3) mixture as adjuvant. Figures 1; references 13: 10 Russian, 3 Western.

UDC 616.98:578.833.21]-092.9-07:616.153.
962.4-097-078.73

Monoclonal Antibodies Against Flaviviruses

Induced by Yellow Fever Virus Vaccine

18400185c Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 4, Jul-Aug 88 (manuscript received 9 Jul 87) pp 461-464

[Article by S. Ya. Gaydamovich, Ye. E. Melnikova, T. G. Mikheyeva, T. M. Shutikova, N. A. Sveshnikova and A. S. Novokhatkiy, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Serological studies were conducted on previously prepared monoclonal antibodies against the FNS Dakar yellow fever virus, to test their reactivities against a broad spectrum of flaviviruses. The monoclonal antibodies were prepared by the immunization of BALB/c mice and subsequent fusion of the immune splenic cells with NS-O myeloma cells. The monoclonal antibodies consisted of IgG2a immunoglobulins that were active in passive hemagglutination and indirect fluorescence tests, but failed to fix complement or display activity in neutralization tests. The monoclonal antibodies reacted with Tyuleniy, Rosio, Karshi, Sokuluk, Ilheus, and Uganda S flaviviruses, but failed to cross-react with Japanese encephalitis, Western Nile, Negishi, tick-borne encephalitis, or Dengue 2 and 4 viruses. These findings are the first to demonstrate serological cross-reactivity between the yellow fever virus and the Tyuleniy virus. In addition, the failure of the antibodies to fix complement while showing antihemagglutinating activity suggests that they are directed against protein E. References 10: 2 Russian, 8 Western.

UDC 579.833.26:579.224]-579.242.44.083.33

Detection of Tick-Borne Encephalitis Virus Proteins by Immunosorption

18400185b Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 4, Jul-Aug 88 (manuscript received 3 Mar 87) pp 448-452

[Article by V. N. Lyapustin, G. G. Karganova, A. N. Mustafina, T. S. Gritsan and V. A. Lashkevich, Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow]

[Abstract] A method was devised for the detection of proteins specific to the tick-borne encephalitis virus (TBEV) in a variety of infected cell cultures by means of hyperimmune equine antibodies coupled to Sepharose. The infected cells were lysed, centrifuged, and the supernatant mixed with the Sepharose gel for protein adsorption. Following affinity adsorption, the adsorbent was washed with the buffer TN and the released proteins

analyzed by polyacrylamide gel electrophoresis. The method was found to be efficient in isolating the virus-specific proteins p93, p79, p69, p53 and p13. However, the viral proteins p24, p23 and p18 were not isolated. The system was also found effective in the isolation of the TBEV structural proteins V3, NV5 and NV4, but not V2 or V1. Figures 2; references 21: 9 Russian, 12 Western.

UDC 578.821.51:578.56

Construction and Selection of Recombinant Vaccinia Viruses Expressing Foreign Viral Antigens

18400185a Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 4, Jul-Aug 88 (manuscript received 9 Mar 87) pp 428-431

[Article by R. A. Gibadulin, V. P. Yuferov, L. F. Liderman, N. A. Parasyuk, K. S. Ionova, N. A. Grodnitskaya, L. V. Uryvayev and V. M. Zhdanov (now deceased), Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] A review of current methodology for the construction of recombinant vaccinia viruses is presented, relying largely on the methodology developed by B. Moss at the NIH. Introduction of foreign viral genes into the vaccinia genome is accomplished by recombinant events occurring between a plasmid bearing the foreign genes at a site where they are flanked by vaccine sequences, and the homologous vaccinia DNA sequences during vaccinia virus reproduction in a target cell. Two plasmids developed by Moss are extensively used, pGS20 and pSC11, containing promoters for the 7.5 kD protein and unique restriction sites (SmaI and BamHI) for insertion of the foreign genes. Transfection of cells infected with the vaccinia virus is most conveniently attained with the Ca^{2+} phosphate method, as modified by Moss. This methodology was used for the transfection of CV-1 cells and the construction of two recombinant vaccinia strains designated IVI-840 GA and RV 895 gal. The former contains influenza virus A(H3N2) hemagglutinin gene, which is expressed in infected cells, and the latter strain bears the bacterial beta-galactosidase gene, which also finds expression in infected cells and facilitates their identification. The success reported here in the construction of recombinant vaccinia viruses opens up appealing vistas for the creation of novel vaccines that will, eventually, have to be assessed on their own merits as to safety and efficacy. Figures 1; references 18: 2 Russian, 16 Western.

UDC 616.98-07:616.153.96-097-078.73

Means of Expanding the Diagnostic Possibilities of Synthetic HIV Protein Determinants

18400190a Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 88 pp 20-23

[Article by R. V. Petrov, R. M. Khatov, I. G. Sidorovich, L. A. Fonina, O. A. Kaurov, A. N. Prusakov, I. A. Nikolayeva, M. Ye. Ivashchenko, S. P. Pavlikov, and A. L. Liozner, Institute of Immunology, USSR Ministry of Health, Moscow; All-Union Scientific Research Institute of Highly Pure Biopreparations, USSR Ministry of Medical and Microbiological Industry, Leningrad]

[Abstract] In an individual infected with the AIDS virus, antibodies to viral core proteins (p24 and p17) are the first to appear in the body's humoral response and are the first to be expressed on the membrane of the damaged cells. Later, the number of antibodies to surface virion structures, which are more immunogenic, grows, and the response to the core proteins, as a rule, diminishes. Confirmatory tests are based on the use of monoclonal antibodies directed at the determinants of the HIV proteins that are coded by gag and env genes or on separate identification of antibodies to the indicated genetically engineered antigens. Such tests, however, merely confirm (or fail to confirm) the data already obtained from a seropositive sample and do not reflect the stage of development of the humoral response to HIV antigens. Examining the possibility of improving the Pepsokrin test, and working with synthetic antigenic determinants that mimic HIV antigens, the researchers evaluated the binding of antibodies from the blood sera of AIDS patients and HIV-infected individuals to synthetic peptides that correspond to viral protein fragments coded by gag and env genes and made a comparison with a Western blot characterization of those sera that made it possible to determine the stage of infectivity from the stage and direction of the humoral response. They found that co-immobilization of two or more peptide determinants on the same carrier molecule or in the same slide cavity substantially increases the efficacy of the EIA primary screening systems for AIDS that are based on synthetic peptides that mimic HIV antigen structures. They also found that separate sorption of peptide determinants from proteins coded by the gag or env region of HIV makes it possible to develop a test system for the differential diagnosis of AIDS that not only identifies individual features of the test sample, but also characterizes the direction of the epidemic chain of the spread of infection and the dynamics of the development of the immune response to HIV antigens in an infected or vaccinated individual. Ten references: 2 Russian, 8 Western.

UDC 616.31:547.96:03:[616.98:578.828.6]-092: 612.017.1.064]-078.73

Synthetic Peptide Conjugates Induce Antibodies to HIV Structural Antigens

18400190b Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 88 pp 24-26

[Article by A. N. Buzina and A. L. Liozner, Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] The use of synthetic or recombinant polypeptides that correspond to HIV protein sequences represents a promising approach to the creation of diagnostic and, possibly, immunoprophylactic preparations in AIDS. Immunization with synthetic peptides or their conjugates with high-molecular carriers, however, is not always accompanied by the production of antibodies

that identify the corresponding native proteins. The authors describe several procedural approaches to the analysis of the specificity of immune sera produced when animals are administered conjugates of a synthetic peptide that reproduces an antigen determinant of the p24 core protein coded by the HIV gag gene. Immunizing rabbits with a peptide conjugated with succinylated BSA or with a styrene copolymer with maleic anhydride modified by ϵ -aminocaproic acid, they produced a specific humoral immune response. The researchers ascertained the conditions needed for conducting solid-phase

EIA to evaluate specificity for synthetic undecapeptide conjugates with the high-molecular carriers. Antibodies to the determinant appeared on the forty-second day after priming with the undecapeptide-BSA conjugate. They appeared earlier after a second cycle of immunization with the other carrier, which the researchers feel may indicate the formation of cells with a memory for the synthetic antigen. Antipeptide sera viral specificity was substantiated when they reacted with a homologous native HIV protein in an immunoblotting test. Two figures, 10 references: 1 Russian, 9 Western.

Charter of the Foreign Trade Company Eye Microsurgery of the Eye Microsurgery Intersectoral Research and Technology Complex
18400273 Moscow FOREIGN TRADE in English
No 11, Nov 88 pp 53-55

[Unattributed article]

[Text] I. General

1. The intersectoral Self-Supporting Foreign Trade Company Eye Microsurgery, hereinafter referred to as the Eye Microsurgery company, shall be an independent economic complex, operating on a self-supporting basis, fulfilling the duties entrusted to it and enjoying the right granted to it in connection with these activities.

The Eye Microsurgery company shall be a juridical person.

2. The Eye Microsurgery company shall operate on the basis of the Regulations on the All-Union Self-Supporting Foreign Trade Organization (Association) approved by Decision No 1526 of the Council of Ministers of the USSR of December 22, 1986, and also on the basis of this Charter.

3. The Eye Microsurgery company shall be liable for its obligations in that part of its assets which, under USSR legislation, is subject to attachment.

The state, its agencies and organizations shall not be liable for the obligations of the Eye Microsurgery company, and the Eye Microsurgery company shall not be liable for the obligations of the state, its agencies and organizations.

4. The Eye Microsurgery company shall have a round seal inscribed with its name and emblem.

5. The Eye Microsurgery company shall have its seat in Moscow.

Postal address: USSR, 127486, Moscow, Beskudnikovsky bulvar, 59A.

Cable address: Moscow Eye Microsurgery. II. Structure of the Eye Microsurgery Company

6. The Eye Microsurgery company shall have the following specialized sections:

export section, the subject of whose activities shall be to export from the USSR various types of medical instruments and equipment, licenses for products developed by the Eye Microsurgery complex or with its participation, joint R & D with foreign companies, to advise foreign patients, design and realize software programmes for optical reconstructive eye operations, train foreign specialists, treat foreign patients, and supply other services within the fixed range;

import section, the subject of whose activities shall be the import to the USSR of medical laboratory equipment and spare parts for it (in the established order) and also other services within the fixed range.

7. Specialized sections constituting the Eye Microsurgery company shall not be juridical persons and shall be guided in their activities by the regulations approved by the Director of the Eye Microsurgery company.

The specialized sections shall be authorized to conclude, on the instructions and on behalf of the Eye Microsurgery company, foreign trade transactions, contracts with suppliers of goods for export, customers of imported goods, and other organizations. III. Subject-Matter and Activities of the Eye Microsurgery Company

8. The subject-matter and activities of the Eye Microsurgery company shall be to fulfil the plan, approved in the established order, on the export of goods within the fixed range and assignments on the import of equipment and services related to the main activities of the Eye Microsurgery company;

increase export of products and services, raise their quality and competitiveness, increase efficiency of operations performed.

9. In accordance with its activities the Eye Microsurgery company shall:

9.1. improve planning and self-supporting activities, elaborate draft five-year and annual plans, and submit them for approval in the established order;

9.2. study and make use of the situation on the relative commodity markets;

9.3. elaborate and practice measures aimed at improving the conveyance of export and import goods and the more effective use of domestic transport facilities;

9.4. elaborate and implement measures aimed at the economical use of material resources and finances;

9.5. export and import products and services within the Eye Microsurgery company's range:

equipment, devices, instruments, spare parts, allografts, training of foreign doctors, treating of foreign patients, other goods related to the Eye Microsurgery company's activity, transfer and receive technical documentation containing inventions and know-how in cases when they are an integrated part of the exported or imported equipment within the company's range;

9.6. promote the export of goods and services, perfect its structure, within the range, improve the quality and competitiveness of the exported commodities and services;

9.7. elaborate and implement measures aimed at developing new forms of foreign economic relations;

9.8. elaborate and introduce measures with the aim of raising the requirements, with regard to quality and technical standards, of exported and imported goods;

9.9. develop and implement measures aimed at organizing maintenance of Soviet equipment and devices sold abroad and maintenance of equipment and instruments imported to the USSR;

9.10. jointly with the Eye Microsurgery complex, elaborate and practice advertising measures furthering the export of goods and services as outlined in para. 9.5 of this Charter;

9.11. ensure legal protection of its interests. IV. Powers of the Eye Microsurgery Company

10. To achieve the objectives specified in para. 8 of this Charter, the Eye Microsurgery Company shall, in the manner established by USSR legislation, be authorized:

10.1. to perform, both in the USSR and abroad, any kind of transactions and other legal deeds, including those of purchase and sale, barter, contract, loan, conveyance, insurance, joint activities and others, with institutions, enterprises, societies, partnerships and individuals, and also to participate in tenders and competitions, and give guarantees;

10.2. to build, acquire, alienate, lease and rent, both in the USSR and abroad, enterprises auxiliary to its activities as well as all kinds of movable and immovable property;

10.3. to set up affiliations, offices, branches, representations and agencies, as well as establish, or participate in all kinds of organization whose activities comport with its tasks;

10.4. to sue and be sued in courts of law and arbitration, and to conclude amicable settlements;

10.5. to participate in international fairs and exhibitions, and also to take part in and arrange specialized exhibitions, symposia, to publish advertising literature related to the Eye Microsurgery company's activity. V. Management of the Eye Microsurgery Company

11. The Director shall head the Eye Microsurgery company, organize its work and bear personal responsibility for all its activities.

The Director shall manage the day-to-day activities of the Eye Microsurgery company.

12. The Director shall conclude contracts, act without the power of attorney on behalf of the Eye Microsurgery company, represent it in all institutions, enterprises and

organizations both in the USSR and abroad, administer the assets of the Eye Microsurgery company in accordance with legislation of the USSR and this Charter, perform all kinds of transactions and other deeds, issue powers of attorney, open settlement and other accounts of the Eye Microsurgery company.

13. The Director of the Eye Microsurgery company shall have deputies. The competence of the Director's deputies and other executives of the Eye Microsurgery company shall be established by the Director.

The competence of the Chief Accountant and the Head of the Legal Department shall be established by the legislation in force.

Board of the Eye Microsurgery Company

14. The numerical and personal composition of the Board shall be approved by the RSFSR Ministry of Public Health.

The Director of the Eye Microsurgery company prepares proposals for the numerical and personal composition of the Board of the Eye Microsurgery company.

The Director of the Eye Microsurgery company shall be the Chairman of the Board.

15. The Eye Microsurgery company's Board shall concentrate its activity on fulfilling the plans, increasing efficiency of foreign trade operations, making full use of favorable situation on corresponding commodity markets, implement organizational measures furthering export, improve quality and competitiveness, raise requirements as to the quality and technical standards of imported goods. VI. Signing of Foreign Trade Transactions on Behalf of the Eye Microsurgery Company

16. Foreign trade transactions concluded on behalf of the Eye Microsurgery company shall be signed by two persons. Authority to sign such transactions shall belong to the Director of the Eye Microsurgery company, his deputies and also to persons authorized by powers of attorney signed by the Director.

17. Bills of exchange and other pecuniary obligations issued by the Eye Microsurgery company shall be signed by two persons—the Director or one of his deputies and the Chief Accountant of the Eye Microsurgery company.

The said bills of exchange and other pecuniary obligations may also be signed by two persons authorized by the powers of attorney signed by the Director and Chief Accountant of the Eye Microsurgery company.

18. The Director of the Eye Microsurgery company shall determine the values and types of transactions whose signing, in accordance with the procedure established in paras. 16 and 17 of this Charter, shall be within the competence of his deputies.

19. The assets of the Eye microsurgery company shall consist of fixed and current assets, constituting its authorized fund as well as of funds for foreign trade activities, set up in the established manner, and also other assets attached to the Eye Microsurgery company.

The assets of the Eye Microsurgery company shall be reflected in its independent balance drawn up in the manner established by the USSR legislation.

20. The Eye Microsurgery company shall have an authorized fund of 500,000 (five hundred thousand) rubles.

VIII. Accounting and Distribution of Profits of the Eye Microsurgery Company

21. The trading year of the Eye Microsurgery company shall be from January 1 to December 31 of the calendar year.

22. The accounts of the Eye Microsurgery company shall be drawn up and approved in the manner established by the legislation in force.

23. The distribution of profits of the Eye Microsurgery company shall be carried out in the established manner.

24. The auditing of the financial and economic activities of the Eye Microsurgery company shall be carried out in accordance with the legislation in force not less than once a year.

IX. Reorganization and Dissolution of the Eye Microsurgery Company

25. Reorganization and dissolution of the Eye Microsurgery company shall be implemented in accordance with the USSR legislation.

UDC 581.526

Quantitative Description of Pacific Pelagic Population. Productive Areas and Primary Photosynthetic Production

18400157a Moscow OKEANOLOGIYA in Russian
Vol 28 No 5, Sep-Oct 88 (manuscript received
11 Jan 88) pp 819-827

[Article by M. Ye. Vinogradov and E. A. Shushkina, Institute of Oceanography imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] Special biological expeditions that have been conducted in the last 15-20 years by the Institute of Oceanography and recent measurements of primary production, concentration of individual groups of zooplankton, and bacterial biomass and production by the research vessels Vityaz and Dmitriy Mendeleyev have enabled a quantitative estimation of the distribution of life and the intensity of biological production processes in the Pacific Ocean. Such information is needed for describing the productivity of specific regions and the ocean as a whole; for establishing the role of the

Pacific and its regions in the global circulation of elements such as carbon, carbon dioxide, O₂, and nitrogen; and, among other things, for verifying the dynamic models being created of the functioning of the ecosystems of the Pacific. The Pacific was divided into areas of high, medium, and low productivity, and those areas were then subdivided into regions whose epipelagic communities bore certain similarities. Additional studies are in progress to allow areas of different productivity to be distinguished in the ocean. The areas of lowest productivity have been found to coincide with anticyclonic halostases of northern and southern central waters. The areas of highest productivity reside in coastal waters, northern and southern temperate waters and eastern-equatorial waters. The rest of the ocean is considered to be of moderate productivity. Annual carbon productivity of the entire Pacific Ocean is estimated as 48×10^9 tons. Figures 2, references 45: 42 Russian, 3 Western.

UDC 579(26)

Quantitative Distribution and Dimensional Structure of Phototrophic Bacterioplankton (Cyanobacteria) In Mediterranean Sea and Atlantic Ocean

18400157b Moscow OKEANOLOGIYA in Russian
Vol 28 No 5 Sep-Oct 88 (manuscript received
06 May 87; after revision 18 Aug 87) pp 828-834

[Article by E. A. Chepurnova and L. G. Gutveyb, Institute of Biology of the Southern Seas, Ukrainian Academy of Sciences, Sevastopol]

[Abstract] Chroococcoid cyanobacteria, which radiate yellow-orange light when excited by blue-violet light, may represent up to 20 percent of the total bacterial biomass in the ocean. This article studies the quantitative distribution of autofluorescent bacterial cells by fractional filtration and luminescent microscopy, based on measurements performed during the 45th cruise of the r/v Mikhail Lomonosov in the Mediterranean, in the Atlantic, off the western Sahara, and in the region of the Guinea Shelf. The Mediterranean was found to be least productive biologically, with low concentrations of phytoplankton in the winter as a result of the high biogen content in the photic zone. The lowest phytoplankton concentrations were found in the Ionian Sea. The bacterioplankton population in the 0-100 m layer of the Atlantic was three times more abundant than in the Mediterranean, averaging slightly over 1.5×10^6 cells per ml⁻¹. Near the Guinea Shelf, the bacterioplankton population—on average, 1.3×10^6 cells per ml⁻¹—was smaller than that off Cap Blanc, and the cyanobacteria population in the 0-35 m layer was 23,000 cells per ml⁻¹. Deepwater stations in the Guinea test range found the bacterial concentrations to average no more than 800,000 cells per ml⁻¹ in the 0-200 m layer. In all the regions, bacterial populations generally grew more sparse with depth. Cyanobacteria represented as much as 16.8 percent of the total bacterial biomass off Cap Blanc at the surface and was 2-3 orders of magnitude less in the Mediterranean. Figures 4, references 16: 9 Russian, 7 Western.

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